Science of Martial Art Techniques

Secret of combat techniques not bound by rules

Yasuo Yoshifuku

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Author

Yasuo Yoshifuku was born in 1944 in Shiga prefecture. He did his undergraduate work in science at the University of Tokyo and received a master's degree in theoretical physics as well as a doctorate from the same university. He is currently a professor of science and engineering at Chubu University, specializing in the fields of sports biomechanics and bioinformatics. Currently involved in the scientific elucidation of sports techniques, especially combat sports and traditional martial arts techniques, he also practices yoga and controlled breathing. His extensive publications include *The Science of Combat Sports* (science-i), *The (Secret) Science of Martial Arts Techniques*, and *The Secret Science of Combat Sport Techniques* (Kodansha).

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Foreword (Author's comment)

It was the tenth day after my surgery when I finally managed to walk inside the hospital. I held onto my side, which was in pain due to a 20-cm incision, and I was already tired of staying in the hospital. When I met my doctor in the corridor, I knew it was a chance for me. I quickly spun around using a martial arts walking technique. My doctor and nurses were surprised to see me move this way. They were convinced that I was ready to leave the hospital and gave me permission to leave the following day.

I was born weak and that distressed me, which was the reason I chose combat sports as the theme of my biomechanics research. I'd been working to scientifically elucidate the question of why strong people are strong, and finding out why helped me become stronger.
As I continued my research, I realized that in combat sports, even if you employ mechanically and anatomically rational techniques, those techniques cannot be used against an opponent who is much more muscular and powerful than you. I came to the conclusion that strong people were born strong, and since I could never be strong, I gave up. And for a long time, I turned away from my research on combat sports.

But at the point of turning 60, I met Mr. Yoshinori Kono, a martial artist, who changed my ideas completely. In an exchange involving several techniques, I had prepared conditions that I thought were absolutely advantageous to me in terms of dynamics, but Mr. Kono easily brought me down, sent me flying, and presented me with his fist or a bamboo sword with blinding speed.

I was overwhelmed by his swift movements, which were quite different from those used in combat sports, and his irresistible strength. Along with Mr. Kono, I started participating in the practice sessions for martial arts instructors. I adopted a method of searching for the scientific principles behind the skills as I learned to master the skills myself.

Before long, I became capable of lifting a person 30 kg heavier than me or flipping over a black belt in a martial arts club while he was gripping my wrist with both hands. I became strong. This was nothing less than a miracle for me. And I also learned to loosen up. I become able to use my body comfortably, and the lower back pain I had long suffered from disappeared.

What happened in the hospital I mentioned earlier was just an example. Fundamentally, this is a martial arts technique for controlling your body. Not only young men, but women and elderly people who are losing physical strength can also improve their abilities.

This book is the result of years of research and practice. Even without rigorous training, there are numerous techniques you can use to improve the quality of your daily movements. As you train in these movements, your mind will also become tough (yet flexible), and you will see overall improvements in both your mental and physical competence.

In Chapter 1, "What are martial arts techniques?", the differences between martial arts techniques and

combat sports are explained. In Chapter 2, “The science of blows,” we cover strikes that are characteristic to martial arts techniques such as thrusts that can’t be blocked, the impact force that can penetrate muscles and armor, and thrusts combined with the grabs of Bruce Lee’s Jeet Kune Do.

In Chapter 3, “The science of swordsmanship and the art of mental presence and immediate reaction” and Chapter 4, “The science of weapons,” we discuss methods to swiftly draw and use a Japanese sword and dynamically dominate a fight against your enemy while pushing off against each other’s swords. We also examine the structure of Japanese swords and why they are so sharp as well as how to effectively use weapons such as spears, bows, and nunchaku based on their unique characteristics.

In Chapter 5, “The science of walking, body movement, and deceiving the senses” and Chapter 6, “The science of bringing down your opponent,” Nanba walking (a method for moving forward while utilizing the force of gravity by kicking the floor), creating the illusion of disappearing, and unbalancing your opponent by interfering with his sense of touch are explained as ways to mitigate the physical strength or power of your opponent.

In Chapter 7, “The science of mind and heart,” I talk about my own experiences of spiritual growth through martial arts techniques.

I will close here with my favorite Dodoitsu (a traditional unrhymed, non-metrical Japanese love song), with lyrics based on key points on martial arts techniques.

Invisible and unstoppable power, go through, Blows are based on traditional secrets.
Draw a sword without using your arms. A disappearing motion slays your enemy.
Closer to the guard is best when pushing with a sword. Find the leverage of a sword to control it.

Unweight yourself to move rapidly. Become unnoticed without strain. Force is not necessary for the shortest and fastest movements.
Create effective motions with martial arts techniques.
Ignore physical strength and power. Learning bringing down your opponent makes you invincible.

Focusing on winning or losing ends in vain. My way of life over life and death.

Yasuo Yoshifuku
April 2013

Science of Martial Art Techniques

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Chapter 1

What are martial arts techniques ?

Genre: General

Question 01
What are the differences between combat sports and martial arts techniques for use in actual battle?

In combat sports and traditional martial arts, people fight under the following five conditions:

1. **One on one (typically classified according to weight, gender, or age)**
2. **With bare hands or only with certain weapons (such as bamboo swords or Japanese halberds)**
3. **Conducted in a ring or on wooden or tatami floors, etc. that are flat and easy to move on**
4. **Restrictions on types of attacks and where the attacks are directed**
5. **Duration is limited (e.g., by a set number of rounds), and a referee announces breaks**

On the other hand, there are no such conditions when it comes to martial arts techniques. The duel between Miyamoto Musashi and Sasaki Kojiro is a good example. Musashi prepared a long wooden sword carved out of a paddle to counter Kojiro's long sword, and he deliberately showed up late. Kojiro threw away his scabbard. In order to irritate Kojiro, Musashi shouted, "You are not using your scabbard, you are as good as defeated," as this is grounds for disqualification in Kendo. It is also said that Musashi somehow found out about Kojiro's plan to gain revenge with the help of a large group of people, so he timed the tides perfectly in order to escape, which is why he showed up late in the first place. In any case, you can see that this confrontation did not meet any of the five conditions of combat sports.

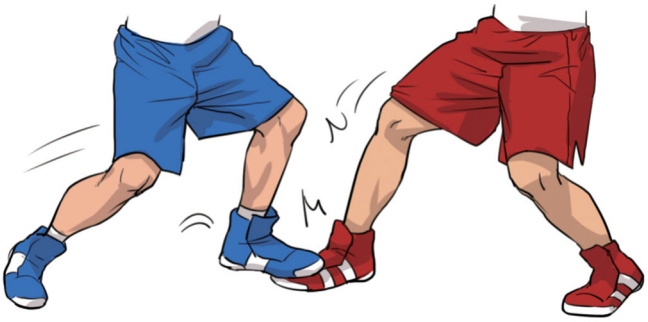
Deciding on rules for safety and fair play is good for contestants. However, some things are not ideal if the goal is to defeat your opponent. Let me give you some examples.

Boxing

It is a natural idea to use good footwork to step on the foot of your opponent; * however, this would be a severe rule violation in boxing (Illustration 1). In some important matches, a contestant has received a punch the moment his foot was stepped on, and this caused great controversy. Another tactic is to escape from a clinch into a position where your opponent can hit only the back of your head, which is a prohibited area (Illustration 2). However, in an actual fight, it is extremely dangerous to turn the back of your head to your opponent. A tiring boxer often lowers his head and clinches his opponent. But in an actual fight, this is as good as asking for a front choke.

*A good example is the walking in the eight trigrams palm of traditional Chinese martial arts. There are various tricks for stepping easily on your opponent's foot.

Illustration 1 Do not step on your opponent's foot.



In combat sports, you cannot step on your opponent's foot.

Illustration 2 Do not hit the back of your opponent's head.

The boxer on this side escaped to clinch with his head turned right, but hitting the back of his head would be a foul.

Mixed martial arts

In mixed martial arts, fewer techniques are prohibited than in boxing. When one contestant is in a mounted position on top of the other, the contestant underneath is not allowed to wrap his arm around the other's neck in order to give a head butt. When looked at from a different angle, it is dangerous to hold down your opponent in a mounted position in an actual fight.

Blows to the back of the head are prohibited, but there is a technique for lifting the contestant you pushed down and throwing him backwards head-first against the floor. This is allowed only on a soft mattress. Such a move may be acceptable on a mattress, but it would be extremely dangerous on a paved road.

Full-contact Karate

In full-contact karate, punches to the face are prohibited. You can exercise your kicking skills freely (Illustration 3) because there is nothing you need to worry about besides high kicks to the face. There is a powerful technique called a torso turning kick. * If you fail, there are no ground techniques to worry about. Attacking a fallen opponent is prohibited, and your opponent can stand up safely on the instructions of the referee. In an actual fight, such kicks are dangerous (especially on hard road surfaces) even if you succeed.

*You hit your opponent in the face or other part with your heel as you roll forward.

Kendo

In Kendo, safe bamboo swords are used in place of Japanese swords. Ippon (a full point) is a strong strike using the tip of your bamboo sword to certain areas including the Men (mask), Kote (forearm), and Do (abdomen). Avoiding being hit on the mask by bending your neck to get hit on the shoulder is not considered an Ippon (Illustration 4). If your bamboo sword hits your opponent's shoulder, the bout continues. In an actual fight, regardless of whether it's with the tip of the sword or near the sword's guard, just a slight touch or strike to any part of your body will take away your fighting strength and put you at an extreme disadvantage. You can try wresting away your enemy's sword or tripping, kicking, pushing, or throwing your opponent without hesitation in an actual fight. But if you try this in Kendo, you will be immediately disqualified. There are thus huge differences between combat sports and martial arts techniques in an actual fight.

Illustration 3 Punches to the face are prohibited, so you can concentrate on kicking.

Producing a low kick at close range with no worries about face punches

Illustration 4 Strikes to the shoulder are not considered a point.

In an actual fight with real swords, you will win if you strike your enemy with your sword, but in Kendo it is not considered a point, and the bout continues.

Question 02
Are martial arts techniques superior to those used in combat sports?

To get straight to the point, given the same aptitude, gender, age, and physique, and almost the same number of years of training and practice time, martial arts techniques are far superior to combat sports. There are two main reasons, which are similar to those found in Q01:

1. **Contrary to combat sports, which emphasize safety, martial arts techniques are a system of techniques for defeating and killing others.**
2. **Martial arts techniques require you to be flexible and mentally prepared to fight at any time and place.**

As for item 1, in a combat sports fight, allowing a rules violation would give the advantage to one contestant. It makes no sense to practice illegal moves. It would be considered foul play if you tried. In martial arts techniques, such foul play is enhanced to such a level that it is regarded as a skill.

As for attacks directed at the eyes, for example, striking with the back of your hand (meuchi) (the back of moderately stretched fingers) in Shorinji Kempo or poking the eyes with your fingertips in Jeet Kune Do are basic skills that are regularly practiced.

I heard about a martial artist who keeps the edges of his thumbnails cut sharp and grows them thick by regularly hitting them against things. Getting your eyes scratched with such nails would be just awful.

There is a type of Chinese clothing with sleeves so long that your arms are completely covered. A school of Chinese martial arts involves tactics for swinging the arms. The hard fabric of the sleeves can be used to injure your opponent's eyes.

With martial arts techniques, you can react swiftly to surprise attacks.

Item 2 is a way to protect yourself from your enemies. Assuming a surprise attack, you are mentally well-prepared to react to it. This is not possible for those who are used to preparing for the start time of a match, as you sharpen your concentration while performing warm-up exercises and start fighting at the ring of a bell or gong. Matches to demonstrate skills in the presence of feudal lords must have been relatively close to today's combat sports.

A karate practitioner was almost pushed off a platform when he was young. He was the leader of a group of juvenile delinquents. Ever since, he has never stood at the head of the line on a platform. A lot of other martial artists have learned to always be prepared. Once, an Aikido expert, while getting off a train, was nearly tripped by a man standing on the platform. The expert very quickly moved his foot out of the way and the man on the platform began to fall off the platform with his back towards the expert. The expert pushed the man into the train car, as if redirecting his fall. Then the door shut, and all ended safely.

Another example is a Chinese martial artist who was walking down the street when a schoolgirl came running quickly from behind. The moment the girl looked back while passing him, her school bag hit him.

His body reacted unconsciously, and he kicked the bag with a rear kick, which scattered her textbooks on the street. Hastily, he gathered her books. It happened in a flash. The passersby had no idea what happened. Fortunately, the girl was safe. But sneaking up on martial artist can be dangerous, even as a joke.

This is nothing compared with the experts, but once I was sitting in a hospital waiting room when an old person came in. His clothes got caught on the doorknob, and he lost his balance. I managed to swiftly stand up and keep him from falling over, while other patients there did nothing but watch.

Jeet Kune Do was created by Bruce Lee. This photo is from the movie *The Way of the Dragon* (1972)

Masters of martial arts techniques also study combat sports techniques.

Even with highly developed martial arts techniques, experts are always attentive. For example, in a school that doesn't use turning kicks because turning kicks create an opening for groin attacks, they may lose to kickboxers if they don't try various defensive approaches. If a boxer thinks clinching is as good as winning, he may not be able to deal with fast consecutive blows. Masters study the skills of first-rate fighters of combat sports and work out countermeasures. Progress can be made through deep exchanges between martial arts techniques and combat sports techniques and adopting each discipline's strong points.

Question 03
How can you distinguish between real and fake martial arts techniques?

Most experts who practice martial arts techniques are muscular, have great reflexes, are blessed with innate capabilities, and have been training for a long time. An ordinary person with a few years of experience has no chance of winning. However, depending too much on one's power and reflexes is not a good sign. If you become an apprentice, your teacher may tell you things like, "If you cannot exert this much force, you are hopeless." As far as I know, real martial artists have the following traits.

1. **They can defeat opponents who are younger and physically superior without giving them a chance to exert their force.**
2. **Opponents cannot see their movements and have no idea how they were defeated.**
3. **They do not brag about winning fights, do not seek out violence, and have good personalities.**

Regarding the first point, I once heard a related story. A martial artist grappled with a sumo wrestler in a training hall, didn't let him show his strength, and defeated him. Then, they went out into the garden and wrestled sumo style. The martial artist couldn't do anything and kept being pushed around*. This was an extreme example. But please be aware that some martial artists create conditions that look fair to ordinary people but are actually highly advantageous.

*The outcome would have been different with a groin attack under sumo wrestling rules (i.e., a real expert could still win).

As for the second point, a boxer's punch is too fast for you to defend against. This is different from using disappearing motions found in martial arts techniques. Certain types of movement, such as shortening one's distance in a flash, cannot be perceived despite one's visual acuity.

Regarding the third point, even if a person satisfies points 1 and 2, you should still stay away from him if he speaks badly about other schools or displays arrogance or too much interest in money.

Question 04
What are actual fights using martial arts techniques like?

Speaking of real fights, various situations are possible. There are duels between martial artists, much milder interleague matches conducted with courtesy between different schools, and brawls involving many people, among many other situations. Here, let's assume an actual fight between a martial artist and an ordinary person. We find the following four characteristics:

1. **Often against multiple people**
2. **Unpredictable if it will end peacefully or become more intense**
3. **Uncertain of your opponent's skills or whether they are armed or not**
4. **Use of excessive force during self-defense**

An example of case 1 is when a Tai Chi expert tries to stop four hoodlums who are extorting a woman. As for case 2, according to a high-ranking expert in Shorinji Kempo, such encounters can start from a simple quarrel. Even if you attempt to resolve matters peacefully, the opponent may fly into a rage and start attacking you. But you can anticipate a fight and prepare yourself. In the above example, one of the three people in front of the expert complained. The moment the expert sensed that a quarrel was going to start, the person who went behind the expert held the expert's elbows. At the same time, the person who pretended to start the quarrel tried to hit the expert from the front. That was the sign for the other two to start attacking the expert.

The hoodlums may have been ordinary boys, but they were used to fighting. They used various approaches to attack the expert. Once, an opponent said, "Let's take off our jackets and fight," and attacked a combat sports expert while he was taking off his jacket.

As for case 3, if the person who went behind the expert had a knife, he might have stabbed the expert instead of holding his elbows. However, if the expert had seriously attacked, he could have seriously hurt the hoodlum (leading to death in the worst case), and the issue of excessive force during self-defense (being the first one to resort to violence) would arise.

How the expert dealt with the situation

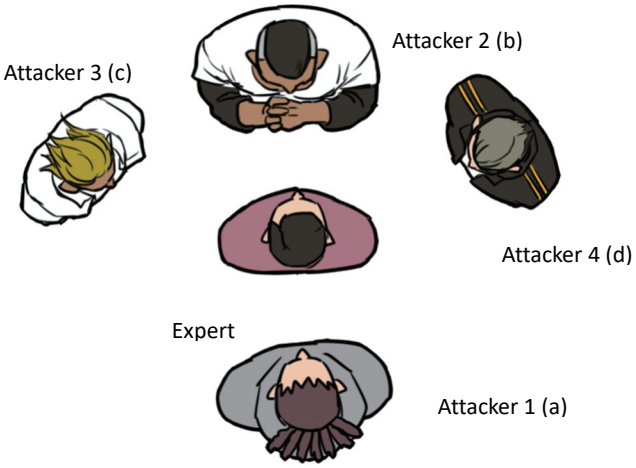
If an extraordinarily strong man holds the expert's elbows from behind as if hugging him, the expert can slip the hold without resistance using body handling skills derived from Tai Chi. When this fight happened, he shook his hips vigorously to convey force to his right elbow and pushed aside the opponent's elbows. Then he gave an elbow to his attacker's body and a slight back kick with a right leg to the groin.

The punch from the person in front was close to a hook. The expert suppressed the inside of his elbow with his left hand, and at the same time landed a light blow to the body with his right fist to bring him down. The person on the left tried to punch him with his right hand, so the expert moved to the left using a walking method from Tai Chi, then pushed the opponent's hand inside his body using his left hand and gave a chest punch with his right hand.

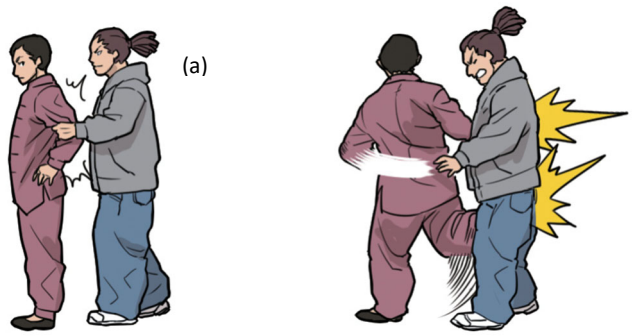
The last person on the right used a right punch. Lightly blocking it, the expert used his right open palm with the back of the hand touching the opponent and pushed him. This style is called Dankei, a swift attack as if flicking the elbow joint to work as a spring.
The four hoodlums were knocked down in a flash, became quiet, and fled the scene. The expert's thrust can incapacitate built-up abdominal muscles and damage the internal organs of a large man fully trained in full-contact karate. This time, considering point 4, the thrust was done softly just to neutralize the opponent's fighting power. So no damage was done.

Still, this expert might have been stabbed. Even if you have experience in combat sports or the martial arts, don't even think about trying out your skills in an actual fight.

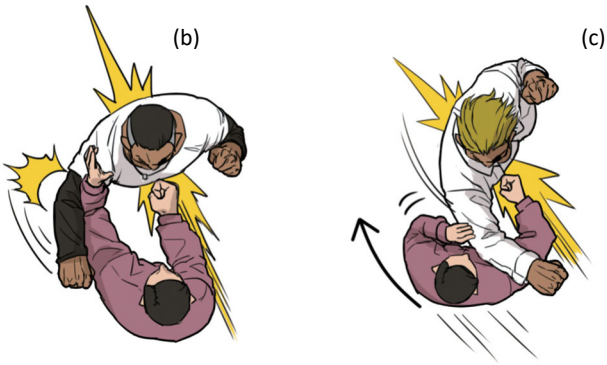
Illustration 1 The situation of an actual fight



(a) held the expert's elbows; the expert turned his body to left to shake off the hold, then turned his body to the right to deliver a body blow with his right elbow and simultaneously a groin attack with his right leg.



The expert blocked a right hook from (b) with left arm at the inside of the opponent's right elbow; at the same time, gave a blow to the body with the right hand to block a right hook from (c); the expert took a step to left with his left leg, at the same time pushing off the attacker's right elbow using his left hand, then gave a blow to the body using his right hand.



The moment the expert thrust forward (c).

Dealt with (d)'s attack in the same way as (c) and struck his body with the back of an open palm (right).

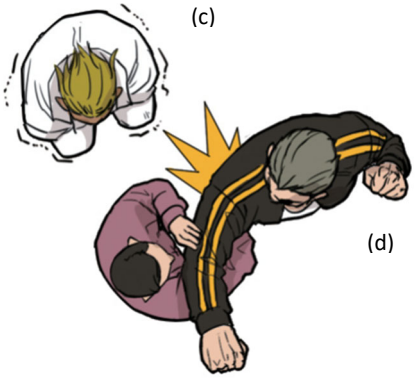


Illustration 2 What is Dankei?

Strike using the back of an open hand, just like a backhand blow.

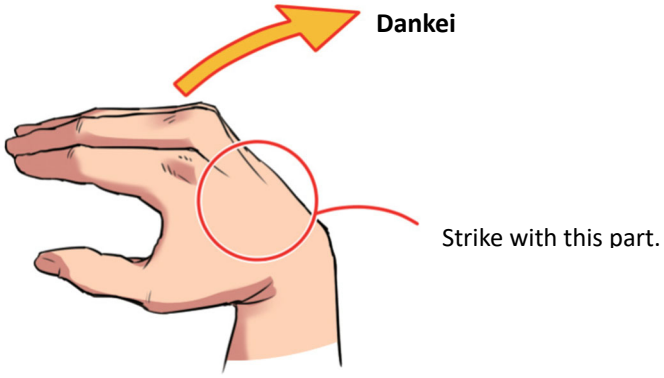
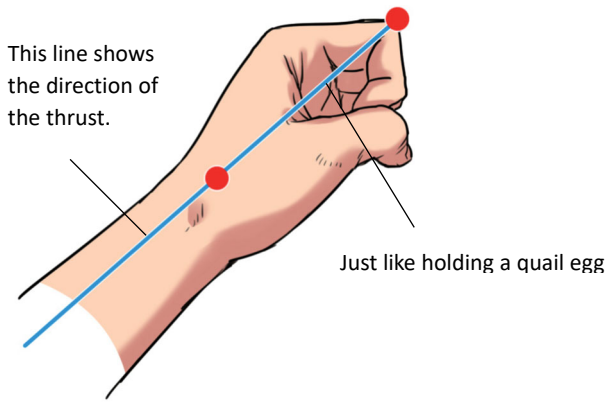


Illustration 3 A thrusting fist is not Seiken but Kuken



Chapter 2

The science of blows

Genre: Blow

Question 05
What is the phenomenon wherein energy is delivered with momentum via a blow based on martial arts techniques?

When energy is delivered with momentum, it doesn't just impact the target spot, but its energy reaches far beyond. Let's look at some phenomena and explain the dynamics involved*.

*Energy transmission can differ from the dynamic interpretation given in this section.

First, line up three people close together. If you strike the person in front, only the third person will be pushed away (Illustration 1). This is the same phenomenon as a chain reaction in a car collision. As in the illustration below, when a 10-yen coin (A) comes from the right side and hits a 10-yen coin (B) in a stationary state, A will stop and B will start moving with the same velocity instead. If there is a 10-yen coin (C) (they can be attached to each other) behind B, then B will stop in the same manner and C will move. The same thing will happen if we add more coins: only the coin at the end will move.

Please note that this phenomenon increases the entire impulse force (refer also to Q50), which is more persistent than the momentary impact force. The person is thrown at a speed proportional to the impulse. Just as happened to the coins, consciously try to transmit momentum to the person in front by accelerating the blow from the center of gravity. It may look like you are pushing with a hand, but it is as good as an attack using the entire body. Make sure your thrusting hand does not act as a cushion.

The next example is Uraate, a technique for breaking only the bottom board when two pieces of board are on top of each other. As part of an experiment, a karate expert attempted to do this several times. Sometimes both boards broke, and sometimes only the top one broke. When only the bottom one broke, we can see what happened was the transmission of force. Nonetheless, we couldn't obtain a result where the bottom one always broke with any types of board.

This can be explained dynamically as follows. Strike the middle of the two boards stacked on top of each other with their edges aligned, and both boards will bend in the same manner. The curve in the middle is greater (with a smaller curvature radius) than at the edges (Illustration 2). I will explain in Q41, but the underside of the board got stretched out and tensile stress was generated. A crack appeared in the middle of the lower part, and it finally broke. Which board breaks depends on their flexibility. If it's not flexible, even a strong board will break before a weak one that is flexible.

After trying various times, we saw that if a flexible board was on top and a stiff one was under it, only the bottom one broke. Too much force would have broken both.

Thirdly, if you strike the neck of a milk bottle filled with water using the heel of your wrist, the bottom will fall out (Illustration 3). The moment the heel of your wrist strikes and covers the neck of the bottle, a

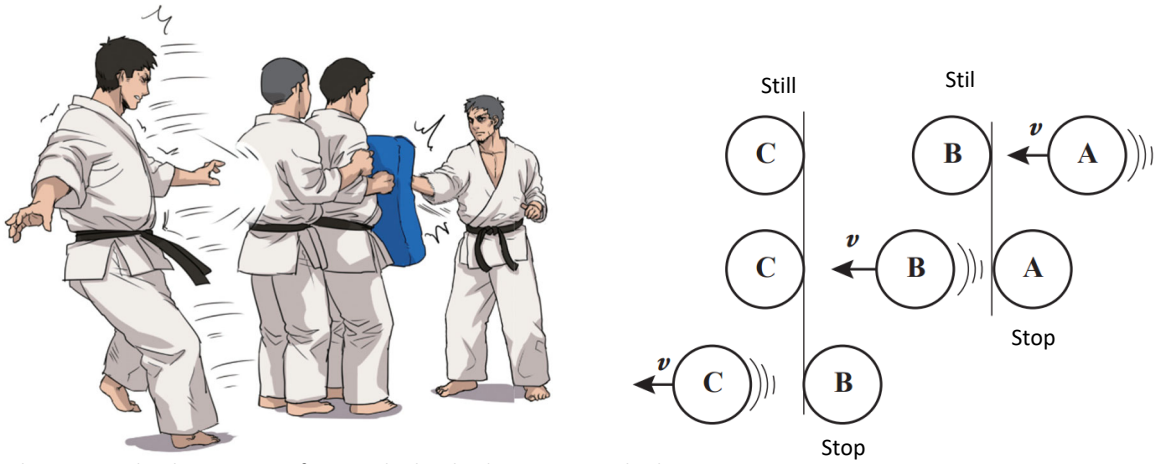
massive impact is transferred to the water. Based on Pascal's principle, the pressure applied to the water is transmitted to the wall of the bottle as if inflating it from inside. The bottom falls out because the bottom is the bottle's weakest point.

The trick is to fill the bottle with water. If there is air inside, the air will compress and act as a cushion, and your experiment will fail. Water alone will not compress, and the pressure transmits well without losing force.

Lastly, let's look at a famous example. An expert of Shoshoryu (an ancient Japanese martial art) tied armor to a pillar and gave an elbow strike to it. There was no damage done to the surface, but damage was done to the bellows inside the armor. The actual movement of the elbow strike is not known. But it is expected to have been not a sharp blow (like a Muay Thai attack which is brought down onto the face from above), but a thrust into the body with full force, as in Chinese martial arts, generating a huge impulse.

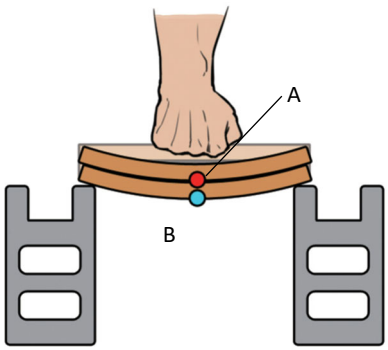
The chest part of armor is arch-shaped. When armor is tied to a pillar, it is supported at the corners P and Q of the pillar as seen in Illustration 4. Using an elbow blow, the armor bends inside toward the pillar, and the area around the middle point A of the inner side is the most stretched out area, causing a tensile stress which will break it. The mechanism of this is the same as the broken lower board in Illustration 2.

Illustration 1 The reason energy is delivered with momentum



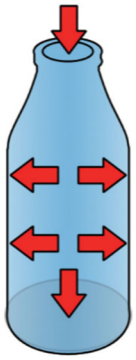
When you strike the person in front, only the third person is pushed away. This is the same phenomenon as described with the 10-yen

Illustration 2 The bottom board breaks first if it is not flexible.



The stacked boards bend in the same way. A and B, the middles of the bottom sides are stretched out more. The bottom board breaks first if it is not flexible.

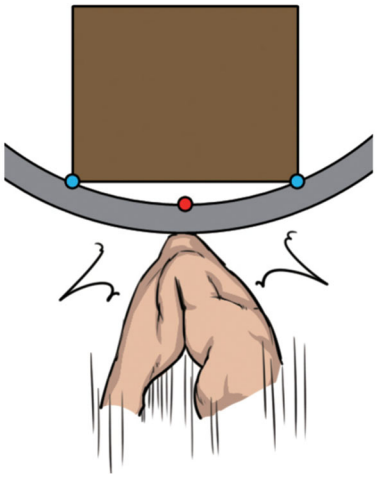
Illustration 3 The reason the bottom of a bottle falls out



Pressure

According to Pascal's principle, the pressure applied to water close to the neck is transmitted to the inside of the bottle.

Illustration 4 The reason the inner side of the armor breaks



The armor supported at the corners P and Q of the pillar bends toward the pillar, around the middle point A (red dot) of the inner side. A tensile stress is generated and thus breaks it.

Question 06
Is there really a way to apply an effective palm strike to an armored opponent?

Armor has the following key functions:

1. **Resistance to blows from swords**
2. **Does not deform and disperses impact forces from outside**

Chain mail worn over clothing has the function of 1 only. With well-made chain mail armor, you won't be injured if attacked by sword. However, since it is deformed easily, you will feel the shock as if hit by an iron bar. You will feel the same if poked or hit by a wooden pole. Armor also has spots that get deformed as easily as chain mail armor. For example, a type of armor called Domaru* with an arched structure around the torso does not get deformed easily by external force. However, to put it on, you must bring both sides together and tie it with a string at the right side (Illustration 1). If you get pushed or hit near the front part that goes inside, it will bend inwards and the impact will reach the torso.

*Domaru is often confused with Haramaki (belly-warmer tie), a similar word. There is also a type that ties at the back.

To bend the armor and produce an impact to the torso, you must make a heavy blow with sufficient impulse. Illustration 2 is a type of slap known as Teppo of Yagyu Shinganryu. Stretch your left arm to hit the target. As you take a step forward with your right foot to align with the left foot, give a slap with your right hand almost over your left hand. If the momentum (weight x velocity (forwarding speed)) of the center of gravity created by stepping forward can be transmitted well, all of the momentum will turn into impulse energy.
When a slap is given, if looked at from above, a triangle is formed with the arms, with the target at the top of the triangle. If you are careful not to bend your arm to act as a cushion, the reaction by the target won't be lost. The opponent will be impacted as if he received a very strong blow to the liver.

Illustration 1 Weakness of armor

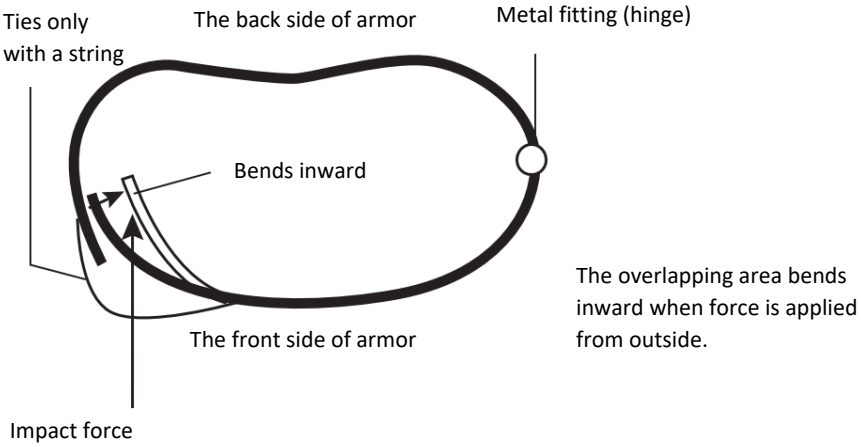


Illustration 2 Teppo of Yagyu Shinganryu

Teppo of Yagyu Shinganryu
Triangle structure turns the momentum from shifting the center of gravity into a heavy impact force.

Question 07
I heard there's a thrust that can't be blocked. Is that true?

To get straight to the point. Yes, it is true. I could use the heavy thrust I learned from Yoshinori Kono on a person well-trained in full-contact karate and break his balance*1.

*1 It was a practice session, and I asked him in advance to block the thrust firmly.

To address this topic, let's simplify it on a dynamic level.
The keywords are the following:

1. **Momentum = Mass X Velocity**
2. **Energy of momentum = 1/2 X Mass X (Velocity)^2**

The unit of momentum is kgm/s, and the unit of energy of momentum is J (joules). Momentum equals the impulse when hitting a fixed target. Let's suppose the person in the example weights about 70 to 80 kg.

As in Illustration 1, the momentum and energies of momentum when he thrusts his whole arm (suppose its mass is 4 kg including the shoulders) at 8 m/s (an ordinary thrust), and when he takes a big step forward with his right leg in Ayumiashi* using his whole body (the mass is estimated at 64 kg with the left foot excluded because it does not move much) at 2 m/s (a thrust that cannot be blocked) from a posture with his left shoulder placed in front are as in the table.

* Similar to Teppo in Q 06 with regard to walking style and dynamics

I chose the figures for mass and velocity to make the energies of momentum for both types of thrust the same in order to show that in a simple motion like a thrust, the energy that muscles can exert is almost fixed.

As in Illustration 2, the impulse of a sideways blocking force changes the direction of the momentum of ordinary thrust. But a thrust that cannot be blocked doesn't change direction easily, and the fist keeps moving in the same direction. To produce a thrust that cannot be blocked, you don't move your arms so quickly against your body, so the maximum value of the impact force doesn't get so high. If it is persistent even when blocking, you can keep producing the thrust in the same direction as your body. Your opponent will lose his balance due to the huge momentum (i.e., impulse), and your next attack will work better on him.

Illustration 1 Movements of two types of thrust

Ordinary thrust
Mass 4 kg Velocity 8 m/s

Thrust that cannot be blocked
Mass 64 kg Velocity 2 m/s

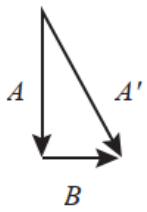
Table: Differences between an ordinary thrust and a thrust that cannot be blocked

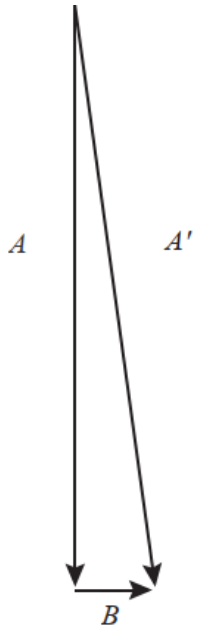
	Mass (kg)	Velocity (m/s)	Momentum (kgm/s)	Energy of momentum (J)
Ordinary thrust	**4**	**8**	**32**	**128**
Thrust that cannot be blocked	**64**	**2**	**128**	**128**

With the same amount of energy exerted from the muscles, momentum differs largely by type of thrust.

Illustration 2 Differences in the direction of momentum

The direction of momentum of an ordinary thrust (same direction as the movement of the object) changes largely depending on the impulse of the blocking force, but a thrust that cannot be blocked doesn't change direction easily.





A=Momentum of thrust
B= Impulse of sideway blocking force
A'=Momentum after blocking

Question 08
What is Jeet Kune Do by Bruce Lee?

Bruce Lee was a huge star of Kung Fu movies and also regarded highly as a martial artist. Lee studied Win Chun, which has been handed down in Guangdong, for three years. After he moved away from Win Chun, he created Jeet Kune Do based on what he had learned*. He adopted the best points of other martial arts and added various approaches of his own. Jeet Kune Do is not a combat sport, but a martial art like Win Chun that you can use to fight any opponent without rules. Lee was also skilled in using Nunchaku and in Kali (a martial arts of the Philippines in which you fight with short sticks in both hands). However, in Jeet Kune Do, the fighting is barehanded.

*Lee adopted many techniques from Chinese martial arts, boxing, fencing, etc. He passed away at the age of 32, so there is an argument that the Jeet Kune Do system remains incomplete.

The basic position is that your dominant hand (i.e., the right hand you can throw a strong punch with) is placed in front, the leg in front has its whole sole on the floor, and the heel of the leg placed behind is lifted. The posture is like that in fencing or Taekwondo. You can move swiftly (especially back and forth) utilizing the flexibility of the rear leg. Tilt the lead leg (including the knee) slightly inward to prepare for a groin attack (Illustration 1).

Lee also studied the footwork of Mohammad Ali, a boxer who could “float like a butterfly, sting like a bee.” You not only use footwork from boxing, but also walking steps like Ayumiashi from karate. You move back and forth, left and right, slantingly and flanking around, and include various skills into graceful footwork on both offense and defense.

As for hand skills, straight punches, hooks, uppercuts from boxing, backhand blows, slaps, chops, hard blows, and elbow strikes are produced from various angles as needed. Poking eyes or throat with fingers are often used as well. Other than these, grabbing your opponent’s arm for the second blow before he recovers from the first one, and letting him react to your attack and grabbing and pulling him off balance are also techniques. (Refer to Q12)

As for kicking, with shoes always on, it is more powerful than barefoot, using any part of your foot including toes, dorsal side (instep), sole, or heel. To avoid a groin kick, you don’t make a big turn when doing a turning kick. Just like in traditional karate and Shorinji Kempo, it starts out as a straight front kick, then changes into a turning kick.

Basic posture and punch

The basic punch is a lead punch, where you thrust your right fist from the posture shown in Illustration 1. You can do this softly like a jab in boxing, but this punch is a combination of speed (lead fist) and power (dominant hand). As in Illustration 2a, you shift your weight forward as you stretch out your rear leg. Furthermore, you twist your heel all the way to face almost forward and turn your body to the left. You

utilize the power of the muscle groups in the rear leg. Your right shoulder will be shifted forward with a swift movement. Using the right shoulder as the first rocket, thrust your arm forward.

Use your left fist to protect your face in preparation for a counterattack. Use the fist you thrust forward to defend against attacks from the left side and pull it back by swinging it to the left into the original position (Illustration 2b). When you produce a punch, your body turns to the left. Transfer that turning momentum (angular momentum) to the thrusting arm. That way you can naturally pull back your arm in an arc, like this (Illustration 3).

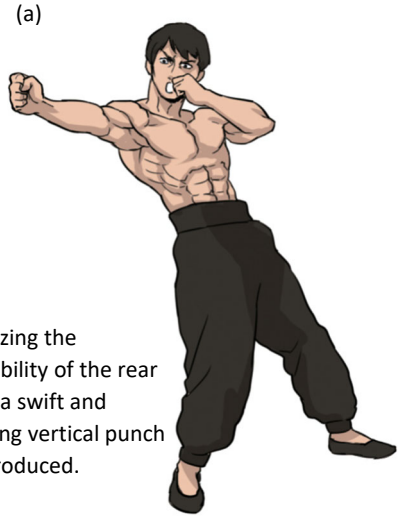
To produce a punch, you don't twist your wrist as in boxing. Lower your elbows, keep your fists vertical, and punch along the center axis line. If your opponent (in a posture with the left shoulder placed in front) tries giving you a left punch at the same time, hit from above and hold with your elbow to deflect the punch (Illustration 4). If your opponent punches from above, twist your fist to push it outside with your elbow. In Jeet Kune Do, you don't stick to one style (here, twisting your fist). You take proper steps and measures in small movements and tactics depending on your opponent and as required.

Illustration 1 Basic posture of Jeet Kune Do

Basic posture with the right hand, the dominant hand in front. The lead leg is kept slightly inward to protect the groin.

Illustration 2 Vertical fist of Jeet Kune Do

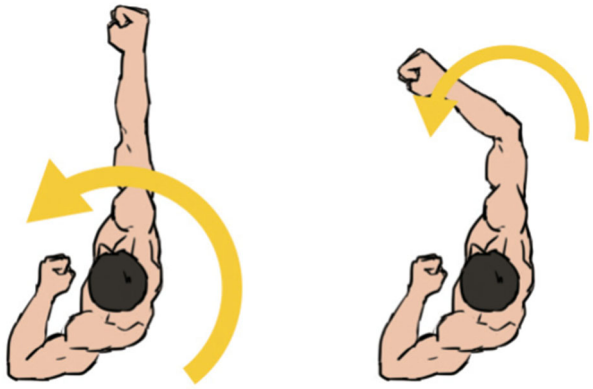
(a)



(b)

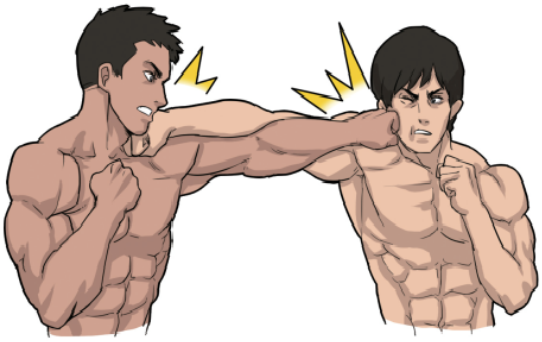
Utilizing the flexibility of the rear leg, a swift and strong vertical punch is produced.

Illustration 3 Dynamic efficiency of the vertical fist

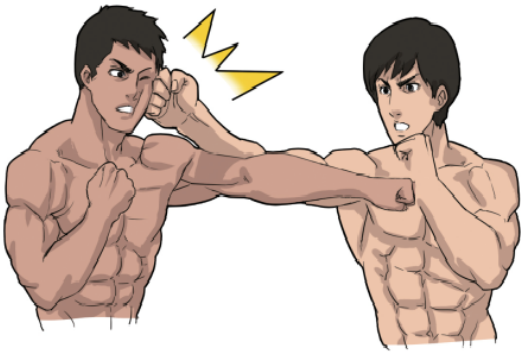


When you thrust your right fist, your body turns to the left. Transfer that turning momentum to the thrusting arm, and bring it back counterclockwise along the center axis line.

Illustration 4 Merits of the vertical fist



Twisting your fist means opponents will hit each other at the same time.



With a vertical fist, you can turn your arm aside and hit your opponent without being hit.

Question 09
Why is Spear Hand often used in Jeet Kune Do?

Spear hand in Jeet Kune Do is called Biljee. Biljee, unlike karate, does not have one-finger spear hand or two-finger spear hand. Spear hand in Jeet Kune Do is a strike using all fingertips slightly bent*1. The impact force may be small because of the small contact area, but the pressure produced is high*2. The name Biljee is said to be a corrupted form of Biu Tze (Biujisao in Cantonese) of Win Chun. The characteristics of Biljee are as follow:

1. **Aim mainly at the eyes.**
2. **Act quickly with no expectation of an impact force.**
3. **Try to reach about 10 cm beyond the knuckles of your fist**

*1 As with spear hand in karate, if the fingers are stretched out, they may bend backward and get hurt from the impact of hitting.

*2 Refer to Q43.

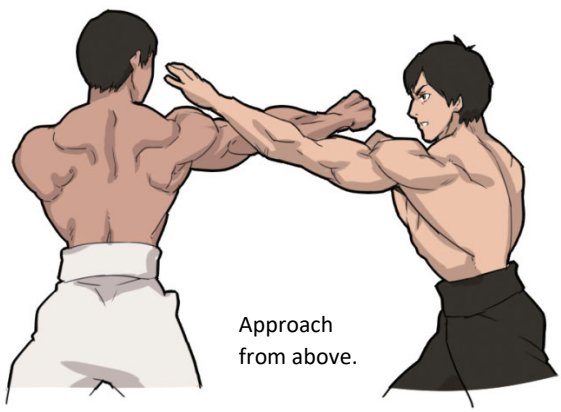
As for point 1, it is highly effective to feint towards your opponent or contain his force because eyes are important sensory organs that cannot be trained.

As for point 2, even with a light jab that has no power, your opponent will strike back. It is necessary to transfer some energy (momentum) to your arm. Biljee requires only a light strike; you don't need to generate much energy from the lower half of your body. Hitting with your hand is enough. For that reason, you can produce it quickly.

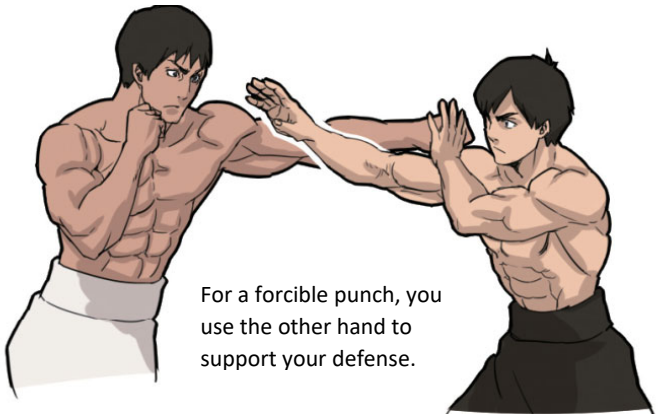
As for point 3, it is the same as if one's reach (the length from one fingertip to the other when arms are extended) in boxing became 20 cm longer. With it, you can reach a tall opponent.

Biljee is good for offense and defense (Illustration 1). When your opponent punches, react with Biljee alone. Start from your center axis line from inside or outside, and at the same time poke his eyes. If the opponent is forcibly punching, use the other hand to support your defense.
Characteristics of Jeet Kune Do are that you can produce your next attack along your center axis line either above or under your thrusting arm. Illustration 2 shows the moment a Biljee was produced followed by an elbow attack at an angle that is difficult to see for the opponent.

Illustration 1 Biljee in counterattack while blocking a hand punch



Approach from above.



For a forcible punch, you use the other hand to support your defense.

Illustration 2 Effective ways to use Biljee

Right after giving an elbow attack, produce a Biljee from under the elbow, which is a blind spot for the opponent.

Question 10
What are the characteristics of offensive and defensive blows in Jeet Kune Do?

In many combat sports and martial arts, your attack is based on counterattack, and you respond to hand techniques such as thrusts. Particularly in karate, you exert much energy by blocking, sometimes with so much force you could almost break the thrusting arm of the opponent. In this way, your movement possibly stops for a moment. Basically, in Jeet Kune Do, defense and counterattack are done in one motion. A punch is produced while relaxed, without stopping, and warding off an attack is done naturally through a powerful counter*.

* Regarding the powers of counterattack, refer to Q26 of my book, The Science of Combat Sports (science-i).

Let's look at some specific examples. (See illustrations.) Illustration (a) shows a moment of fending off a face punch outward and producing a counter into the opponent's face, which has been left open to attack. You block as you pull away your right hand used for blocking, so your opponent doesn't feel much force, and this makes it hard to even notice that he was blocked. By pulling away your right hand, your body rotates to the right, and you can give a left punch with the rotating momentum in the counterattack.
Illustration (b) shows how to deal with a hook to the face. From basic posture, if you rotate your body to left, just moving your arm against your body can be defense and counterattack. Illustration (c) shows how to deal with a body hook. Use your upper body flexibly to keep away the body targeted for a hook from the opponent. As you block the persistent hook with the left arm on a counterclockwise rotation, punch from the front into the face open to attack.

Illustration (d) and (e) show how to deal with a straight punch to body. In Jeet Kune Do, you often aim below the belt, which is vulnerable to attack. In such cases, counterattack with a punch to the face while pressing down his thrusting arm with almost no rotation to your body. If you press too hard, your opponent's arm will move away from you and it will be easier for him to fight back. Hit with minimum force.

Illustration In Jeet Kune Do, blocking and counterattacking happen simultaneously.

(a)

Instead of blocking, fend off a face punch outward off the center axis line, and the opponent's face becomes open to attack.

(b)

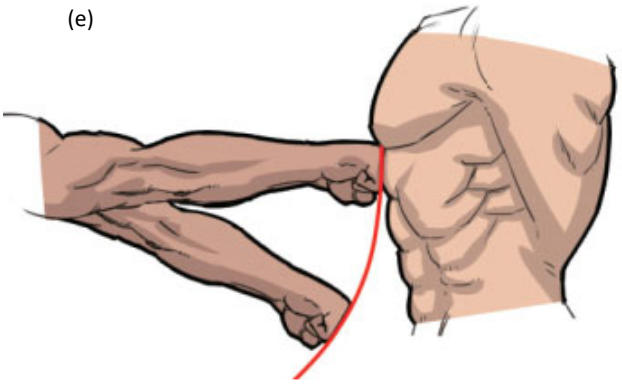
Against a hook to the face, block with your left hand using the momentum from rotating your body to left. At the same time, counterattack with your right fist.

(c)

Against a body hook, as you keep away your body, defend and counterattack using the rotating momentum of your body.

(d)

(e)



Push down a straight body punch, and his fist won't reach you.

Question 11
What hand techniques are unique to Jeet Kune Do?

I will introduce techniques Bruce Lee showed in fight scenes from the movie *Enter the Dragon*. The fight starts with a situation where two contestants face each other with their right arms crossed. In this situation, striking your opponent with your right fist is difficult because the opponent's right arm gets in the way. An expert can perceive your arm movements and defend himself, so it becomes even more difficult.

In the movie, Lee used a technique called Pak Sau*. He slapped down the opponent's arm for defense and punched him in the face. Most viewers didn't know how he could throw the punch because it was so fast.

*Allegedly, it originated from Paksao of Win Chun, but the technique differs even though it has the same name.

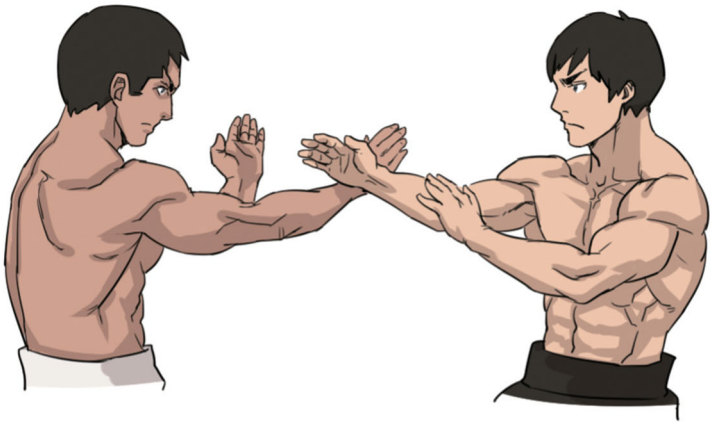
Next, I will explain a few things about Pak Sau. Illustration (a) is a face-to-face situation with their lead arms crossed. If one of them produces a backhand blow or a Biljee into the face and the other blocks it, they will be in a comparable situation. The person on the right proceeds and slaps down the opponent's right hand with his left hand (Illustration (b)), then he goes on to attack the opponent's face while holding down his right hand (Illustration (c)).

When an expert uses Pak Sau, you cannot prevent it no matter how prepared you are. When the expert proceeds, he doesn't move the point of contact of his arms, and doesn't change the applied force. It is hard for you to read his movements. Even if you realize this and put strength into your arm to prevent it from being slapped down, you will just be tossed away. It is not a simple slap with his hand. Using the momentum from going forward, as if to flatten your blocking arm, he transfers his whole-body strength to the hand.

Some can use the joints of their whole body flexibly and manage to maintain the positions of their arms when hit by Pak Sau. In Jeet Kune Do, you immediately change your tactics for such opponents. You can let your opponent block your right fist to the face and give your left fist to his right side, which you intentionally left open to attack.

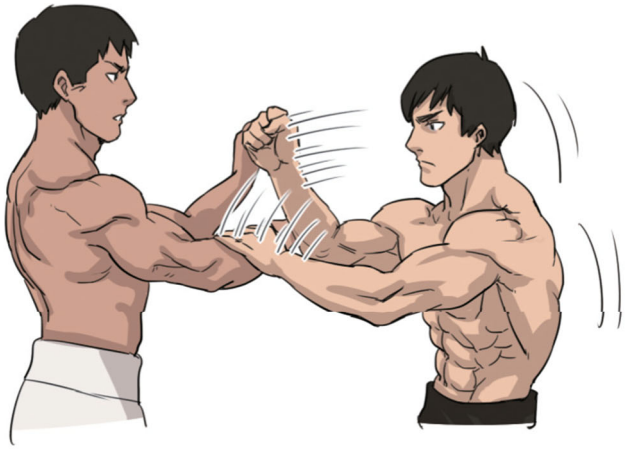
Illustration Pak Sau in Jeet Kune Do

(a)



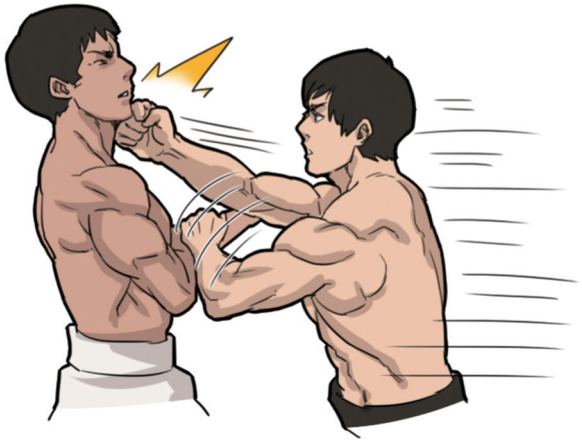
Perceives the opponent's next movements on attack from the point of contact of the lead arms. This is a common situation when trying a Biljee, a backhand blow, etc.

(b)



If he moves forward (person on the right) without moving his point of contact, it is difficult for the opponent to perceive. Slaps down the opponent's right hand with his left hand.

(c)



Keeps holding down the opponent's right hand as he attacks with his right fist. The body turns to right in (b) by turning the body to the left here, and if the opponent draws back his head (left in the illustration), his right fist can still easily reach it.

Question12
In Jeet Kune Do, do you mix grips between blows?

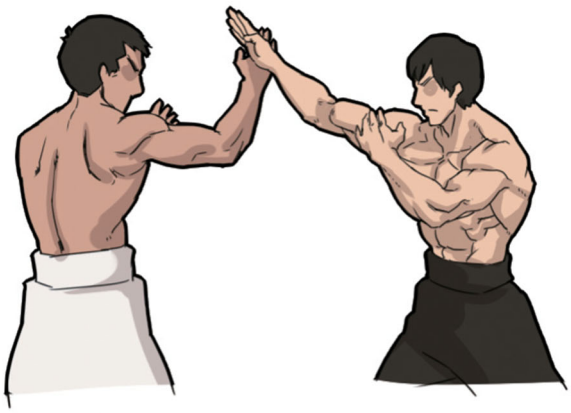
Pak Sau in the previous section is not a simple strike. I will introduce another technique based on Win Chun, called Lap Sau, a grabbing technique. This is a combination of a grab and an attack made using a very quick movement.

Illustration (a) shows a moment when B (on the left) is blocking A's (on the right) Biljee. You often intentionally make your opponent block your attack. The moment the opponent blocks, then A uses his right hand to grab B by the wrist. (Illustration (b)) Rotating the body to the right using the muscle groups in the lower half of the body produces a strong pulling force, and the shoulder is also pulled ahead, enabling him to produce a face punch with the left fist. (Illustration (c)) Note that pulling and hitting are powerful because they are not produced using power from the arms only.

If the opponent is ignorant of this technique, he could receive such a large shock that he will suffer a whiplash injury and lose his balance. He did not pull after the grab, but the momentum of the first attack turned into an energy to pull. Judging from what I have experienced, with little knowledge of evading and blocking techniques of beginner-level self-defense, there is no chance to even try such a technique. When you lose your balance, you are vulnerable, so even a relatively small impact force can damage you.

If B is aware of this type of technique, he will probably block the attack from the left fist (Illustration (c)) with his left hand. Here again with a left-hand Lap Sau, push B's left hand onto his right hand, which has already been pulled. (Illustration (d)) Striking back this push is dynamically impossible. This makes B defenseless because he can't use both hands at the moment. He can't block the right fist attack to his face. Lap Sau can be mixed with Pak Sau as described in the previous section.

Illustration Lap Sau in Jeet Kune Do

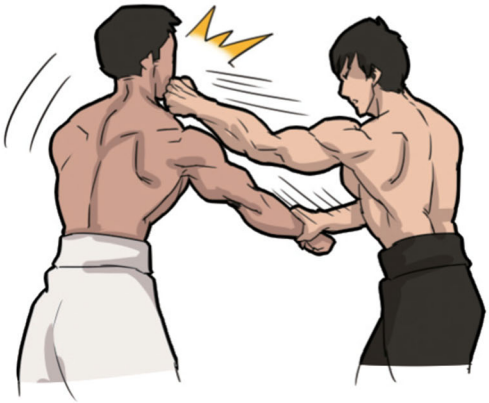


(a)

B blocks A's face attack.

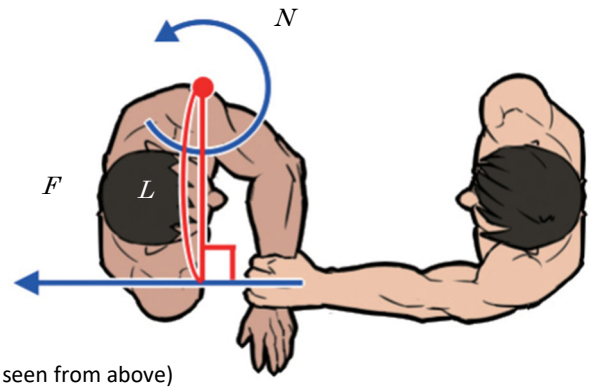
(b)

A grabs B by the wrist with his offending hand.



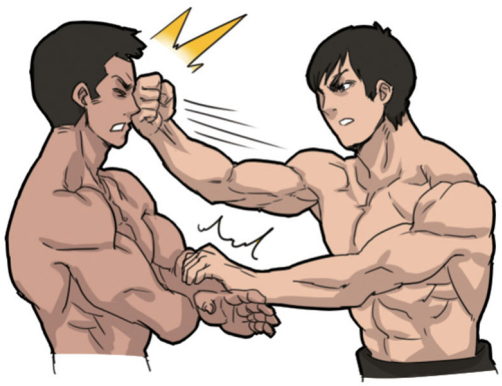
(c)

Rotates the body to the right using the power of the muscle groups in the lower part of the body; strikes the face with the left fist while grabbing the right hand and pulling it.



(d seen from above)

Since A's arm is extended straight, he can push with powerful force F; for B to push this back he needs to produce torque *N=FL* around his left shoulder joint. However, *F* and *L* are also high, and *N* is extremely high, so this is impossible.



(d)

When B blocks a left fist with his left hand, hold down B's hands again with Lap Sau for attack. This is inevitable.

Question 13
What are offensive and defensive kicks like in Jeet Kune Do?

As I mentioned in Q08, in Jeet Kune Do, you kick with the shoes on, as it is more powerful than going barefoot. As in other martial arts and combat sports, you kick for offense and defense. I will introduce kicks not only for offense but also for defense that are often seen in Jeet Kune Do.

Illustration 1 shows the moment of blocking a left shoulder punch from the opponent with shoulder rotation, a counterclockwise body rotation while keeping the face away, and at the same time, using the energy from rotation, to kick with the pivot foot on the counterattack. You can also give a groin kick.

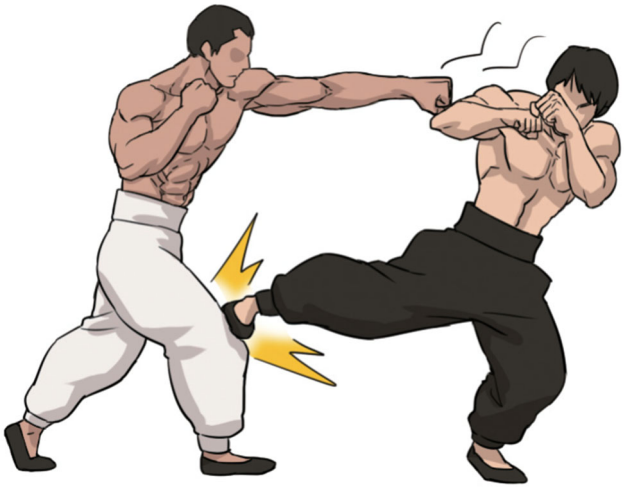
Illustration 2(a) shows the moment of blocking a high right kick and simultaneously giving a groin kick using the lead leg (right). Against full-contact karate or a Muay Thai style sideways turning kick, you can stop the knee or thigh of the kicking leg with your sole using almost the same form.

In Illustration 2(b) as well, he responds to a high kick using a left kick to the pivot leg (or the groin). As is common with Illustration 2(a), when counterattacking it is necessary not to block the kick on the spot but to make small exploratory steps and avoid the spot where the kicking velocity reaches its peak.

Illustration 3 shows the moment when the opponent starts kicking. He stops it by thrusting forward his rear left leg as if stepping on it. This kicking style resembles Fujinkyaku from Chinese martial arts. Unlike Sokuto*, the toes face up, so you can easily draw back your rear leg to its original spot after making a swift kick. In this kicking style, the momentum of your body moving forward can easily be transmitted. It is easy to stop the kicking leg and the opponent loses his balance. Also, in the moment your opponent carelessly stands up with extended knees, kick his knees to cause serious damage.

*Use the kicking style described in Illustration 1; strike with the little toe side.

Illustration 1 Kick in Jeet Kune Do (1)



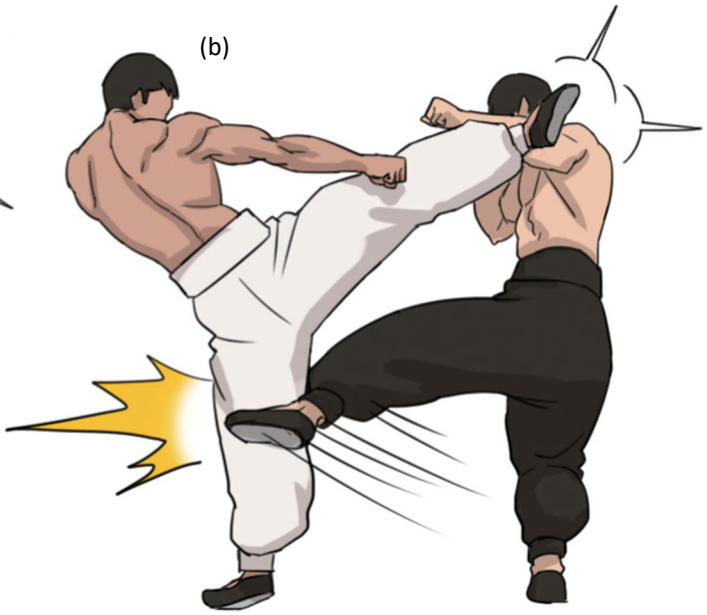
Avoids the left straight punch with shoulder rotation, rotating body to the left while keeping the face away and shifting the center of gravity to the rear leg (pivot leg when kicking), and kick his pivot leg (or groin) at the same time.

Illustration 2 Kick in Jeet Kune Do (2)

(a)

Kicks the groin with the lead right foot in response to a high kick

(b)



Takes small steps into the background when escaping a high kick. Rotating the body to the right, sweep the opponent's pivot leg as he blocks the kick with his shoulder.

Illustration 3 Kick in Jeet Kune Do

Stops the opponent's kicking leg using a kick resembling Fujinkyaku. Utilize the momentum created from shifting the center of gravity forward, and your opponent will lose his balance.

Question 14
What methods of resilience are characteristic of martial arts techniques?

I've explained scientific ways to enhance physical resilience in my book *The Science of Combat Sports*, but I will add some more information here.

There is no way to train a brain to be resilient. To enhance the resilience of the head, the only way is to reduce the oscillation of the head after it has received a blow. For a hook to the right jaw, for example, pull your left shoulder forward and inward, rest your left jaw on the collarbone, and fix it to reduce the oscillation of the head. Based on the same principle, hold your head with one or both hands to double block it when thrusting your elbow forward. This can reduce any damage you sustain.

Next, I will introduce two methods from Chinese martial arts to help become physically resilient. Though they are not scientifically verified, you can feel the effects for sure.
Shinichi Ito, a Chinese martial artist, made me stand with my legs wide open and bend my knees, a standing style called Mahotantoko (Illustration 1). He grabbed my right calf, thigh, and several other parts with his palm and lightly twisted sideways, inward, and outward. He told me to remember how that felt. Then, suddenly, he low kicked my leg. However, though I felt the impact, I didn't feel any pain, my knees didn't bend, and I could stand calmly.

The Tai Chi expert Hideyuki Ikeda taught me Tai Chi ways of standing (including Risshinchusei) in front of many seminar students. He took my right arm and extended it forward and let me breathe. He told me to keep that feeling. Then he gave me a hard thrust to my right chest (Illustration 2). The thrust was so strong that I felt the shock, and the students watching it gasped, but no damage was done. In both examples, there was no damage to my vulnerable body. I realized again that humans have unknown abilities.

Illustration 1 Mahotantoko

This is one of the basics to build up the physical strength that is necessary for Chinese martial arts. This is hard training. If a beginner starts without adequate preparation, he may hurt his knees or other body parts.

Illustration 2 Author being instructed on how to stand in the Tai Chi style

Author Hideyuki Ikeda

Author being instructed by Hideyuki Ikeda on Tai Chi ways of standing such as Risshinchusei, Gankyobappai, Chinkentsuichu. Though it was just for a moment, strong resilience was created.

Question 15
Is there a method to apply effective blows that can penetrate the defensive power of muscles?

In the previous section, my experiences of using special techniques to temporarily become resilient to blows were mentioned. Though I didn't tauten my muscles to absorb the impact, no damage was done to my body. Contrary to that, this section is about how to damage an opponent who is trying to block the impact force. The characteristics of blows in this method are that their impact force is equal to or rather smaller than that of regular blows.

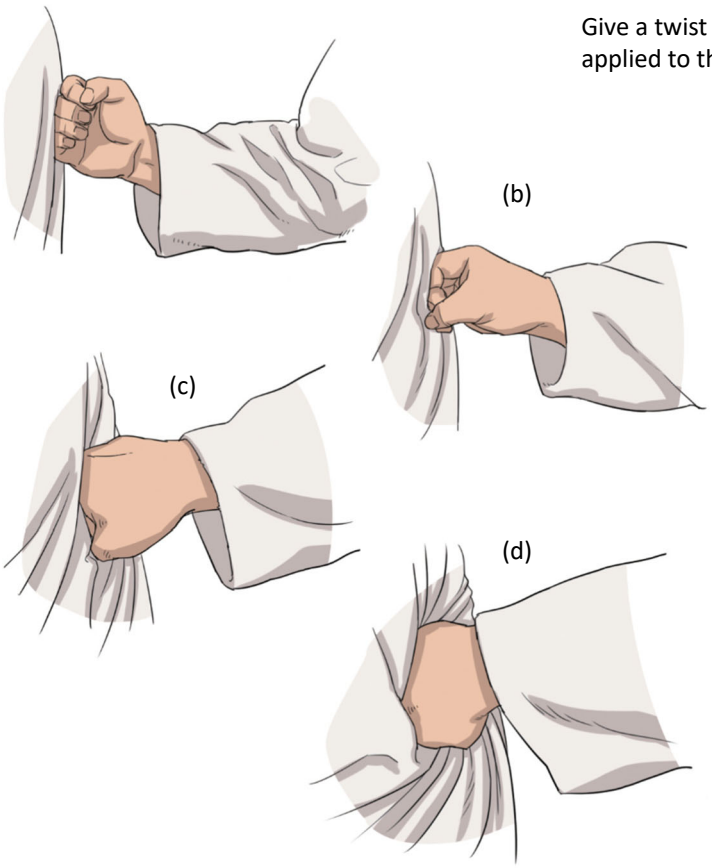
Let's look at some examples. When you strike someone's chest with Seiken or Hiraken*, usually the impact force from the specific area such as Kento (knuckles) or the wrist side of a fist is transmitted to the chest. However, in this style, with Seiken (sometimes from a softly touching state) using a twist like in karate (Illustration 1), and with Hiraken, using a twist of the lead arm (Illustration 2), the contact point will roll over the chest. Seiken and Hiraken are formed differently, but for both, the pinky side touches first, and the thumb side last, to transmit the impact force. The travel distance of the contact point is about 10 cm.

*Flat side of a fist. Thumb is next to index finger. Thrust by special grip of Toroken is the same as Hiraken in principle.

Even a person with full-contact karate experience who calmly blocks a black belt's straight punch will groan and lose balance if an expert lightly thrusts him in this way. And if thrusted lightly with Hiraken or Toroken, besides the impact force, unpleasant pain will come from contact points of the thumb side of the fist and penetrate deep into the chest. Because the abdominal muscle protecting the abdomen and the greater pectoral muscle protecting the chest are very wide, if the point of contact with a fist changes, almost the same contraction force of the muscles can absorb the impulse. After all, it is not so closely related to the contraction of muscles.

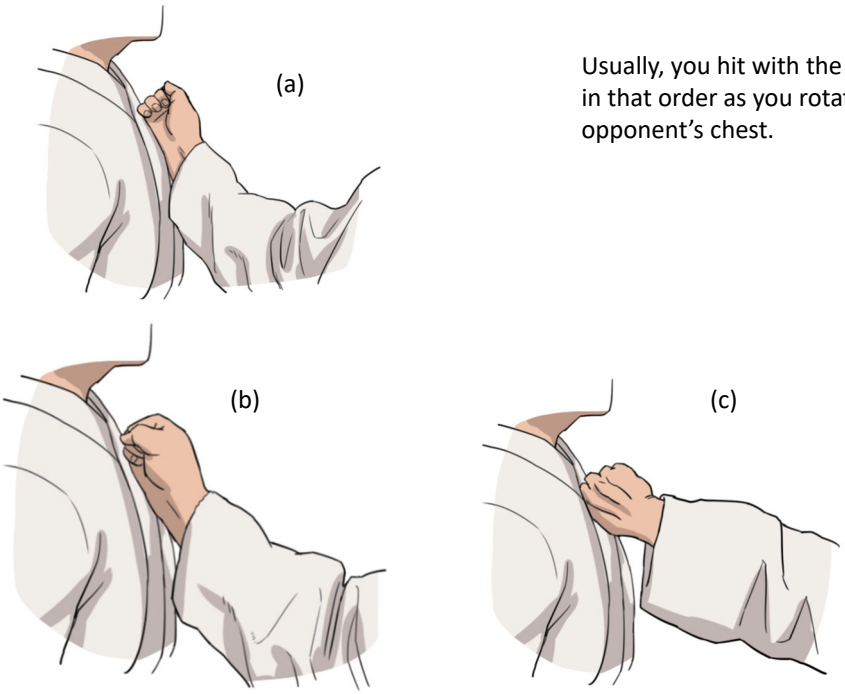
I didn't go into details, but to avoid damage from impact force, not only the contraction of muscles, but also tension of skin and fascia and other physiological preparations (Tai Chi mind concentration) are necessary. Having the point of contact move may be the reason that preparation can never be enough.

Illustration 1 Thrust penetrating muscle armor

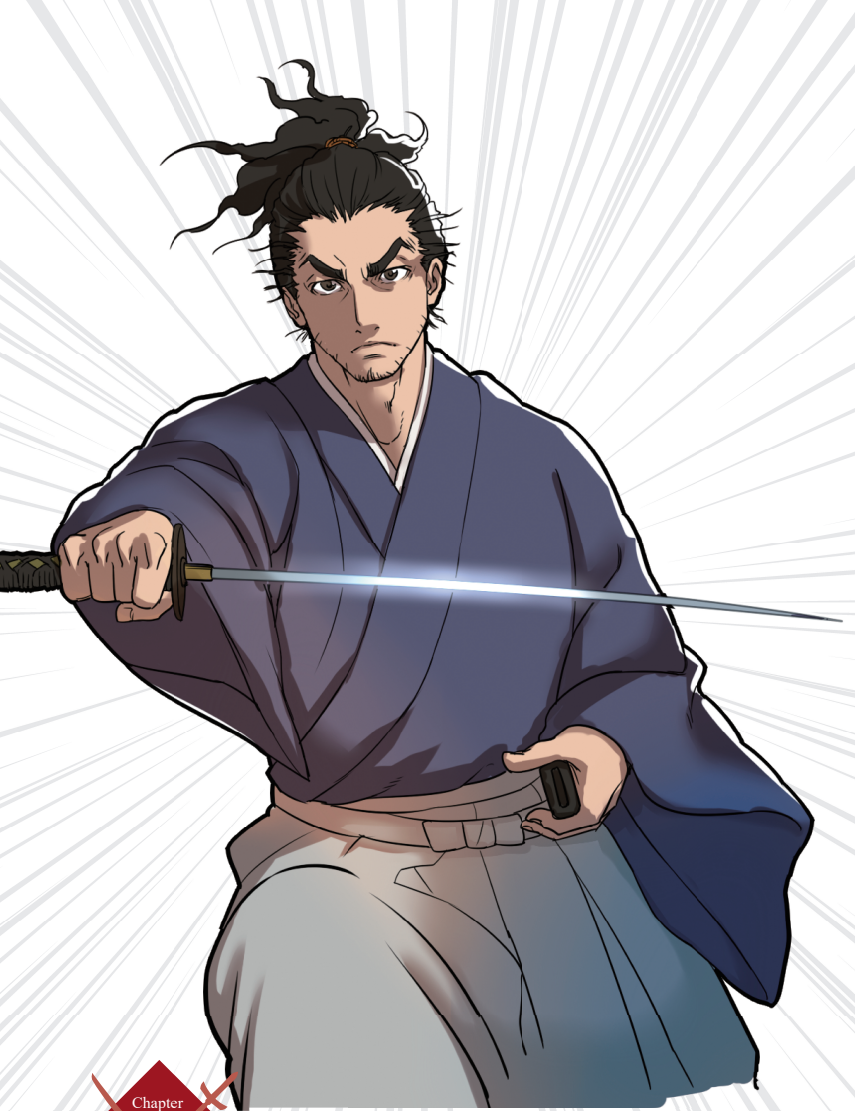


Give a twist to your fist when thrusting, and the point where the force is applied to the body moves.

Illustration 2 How to thrust in Toroken-like style



Usually, you hit with the flat side of your fist as in (b). If you hit (a) (b) (c) in that order as you rotate your fist, unpleasant pain will penetrate the opponent's chest.



Chapter 3

The science of swordsmanship and the art of mental presence and immediate reaction

Genre: Swordsmanship

Question 16
What is a fight like with real swords?

In Samurai movies that were popular in my childhood, the main character cuts down enemies one after another. In the famous *Kagiya no Tsuji no Ketto*, Araki Mataemon, a master swordman, supported a retaliation and cut down as many as 36 enemies. But that is fiction. In reality, he only cut down two people.

If two people on your side were cut down at the beginning of a battle, no one else would try attacking such a strong enemy. If you attack with many others all at once, you may have a chance of winning, but you also risk losing one or two members on your side. With one person getting cold feet, all the others must have escaped with their lives. Unlike a match in which if you lose one point, you still have a chance of winning by two points, losing by one point ends your life in a real fight.

If your life is at risk, it is difficult to show your true abilities. It takes a lot of training to swing a sword with soft grip, but after a fight one's hands become stiff due to the tension, and some can't even let go of their swords by themselves. This is the state of mind when you have a fight with real swords.

Specific examples

Considering this state of mind, let's look at some examples of real sword fights. At a practice session, I was given a bamboo sword and stood face-to-face with an expert holding a real sword. He had great techniques. If I tried striking him with a bamboo sword from sideways, he could easily dodge the blow. The sword was roughly polished using a method for the best sharpness*, about which it is said that one touch can cut off a finger and a slight cut can sever a wrist.

*It is said so generally, but some swordsmen say swords cut better when completely polished.

I held my bamboo sword right in front of him, and the sword he held looked like a dot to me, and it felt uneasy. The tips of my bamboo sword and his sword were one meter away, but I couldn't close the distance. The expert moved slowly towards me as he changed his posture, I was overwhelmed with his spirit and by fear, which contradicted my wish to remain still. Keeping the same distance between us, I withdrew all the way back to the end of the training hall.

The next person had more knowledge of Kendo than me. He didn't withdraw when the expert moved towards him. I watched with admiration. Then, another expert called out, "You are already cut with that distance. You should back off like the previous person to avoid being cut."

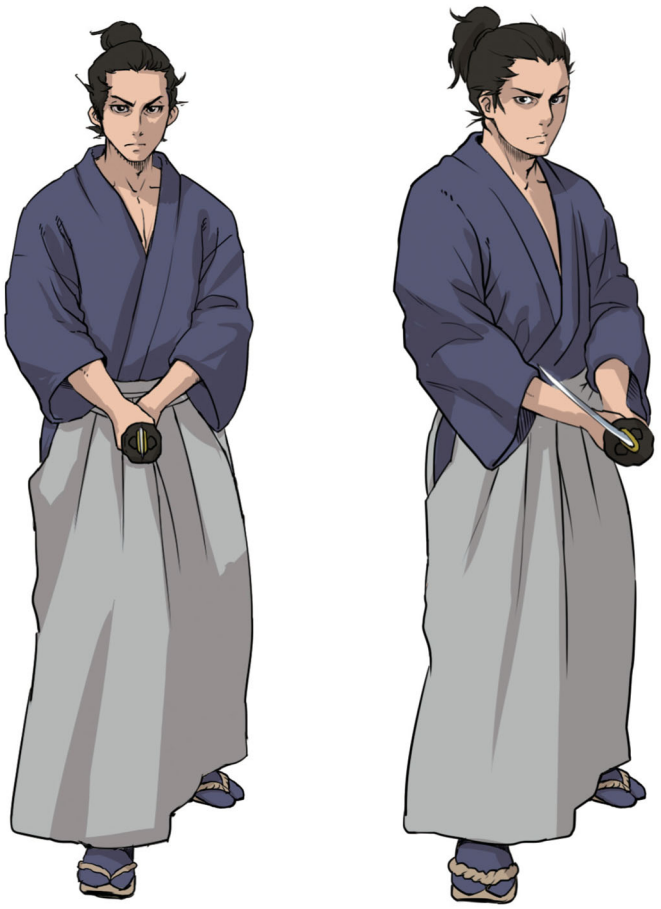
Next is a story that happened around the end of the Edo period, which has been passed down by relatives of my family. A thief armed with a sword broke into a house, and the property owner of the house took out his sword and got into a real sword fight. They held their swords and glared at each other. And for about thirty

minutes they couldn't move. (The exact length of time is unknown, but it must have been an awfully long time for them.) Then, the property owner found a chance, and attacked the thief. While the thief dodged, he was cut on the arm but escaped.

In the Mishima Incident of 1970, Yukio Mishima, a writer and a possible candidate for the Nobel Prize, invaded the camp of the Self-Defense Forces in Ichigaya, Tokyo with four members of Tatenokai (the Shield Society). He tried to inspire a coup, but in vain, and thereafter committed seppuku (suicide). Masakatsu Morita was assigned to assist Mishima's suicide. His first attempt to sever Mishima's head was a failure because of the distance problem. On his second attempt, he failed again because the blade accidentally hit the teeth. The sword got chipped in three spots, and the blade was bent. According to experts on techniques of drawing a sword, his emotional state must have prevented him from gripping the sword in the right position and to keep the blade standing (see Q36 and Q37).

There is a story about a soldier in the Imperial Japanese Army who entered an enemy's trench and cut down enemy soldiers with a Japanese sword. He calmly looked back and mentioned how effective it was to avoid their helmets and slash them diagonally. Even in a state of panic like being in a battlefield, if you have no hesitation to fight, you can perform at your best. Aside from being good or bad in a way that's completely different from sporting matches, fights with real swords require the ability to risk your life.

Illustration1 A sword appearing as a dot / Illustration 2 A sword that looks like a line



When held like this, the sword looks like a line, which makes it difficult to determine its distance. You freeze with fear when the sword glitters as the swordsman moves.

Question 17
Is it possible to stop a sword between your bare hands?

Generally, Shinken Shirahadori (stopping a sword between your bare hands) means catching a sword that was swung down from above your head by trapping the blade between your palms. To try this safely, try to trap someone's hands between yours instead of a sword. Most likely, you will be too late and get hit on the head, or you will be too early and your hands will get hit.

Suppose the velocity of a sword is 30 m/s (108 km per hour) *, the same speed as a swinging baseball bat, and your palms measure 10 cm. This means the sword will pass through your palms in 1-100th of a second. There is no way you can time this. The natural movement is to put your wrists together first with open fingers, forming a V with your hands. If you are even 1 cm off the correct position, your wrists will be cut.

*There are reports of velocity estimates of 200 km/s to 300 km/s.

But suppose you are lucky with the timing, have your hands in the ideal position, and successfully catch the sword between your palms. A sword weighs about 1 kg, which is about the same weight as a baseball bat. The hands catching the sword would not be able to withstand the impact. Your elbows would bend and your hands holding the sword would hit your head. Even if your head was not cut, the impact would be just like being hit by a bat. Please do not forget that, forgetting its sharpness, a sword is like a pole made of steel.

Real fights involve not just straight blows but pulling and pushing as well. The other part of the sword (closer to its tip if cutting while pulling) not held by the hands will strike and cut your head. If your opponent realizes his sword is caught and immediately twists the sword, it would seriously injure your hands.

In conclusion, Shinken Shirahadori (catching a sword between your bare hands) is not possible. Next, let's look at more practical ways to do Shirahadori. For example, I was greatly impressed by Shigeru Oyama's demonstration at a Kyokushin Karate tournament. Two sides sat face-to-face on their heels. The opponent drew a sword and swiftly held it above his head to cut Mr. Oyama. But he stood up from his knees. As he stepped with one leg, just before the sword picked up speed, he caught the middle part of the sword where the velocity was lower than at the tip, using a small force like slapping a mosquito. At the same time, he kicked the opponent's stomach as if stepping on it with his sole to throw him off and seized the sword. (Illustration 1)

The slow movement of the sword from when the opponent held it over his head to when he brought it down created an opportunity. Mr. Oyama could catch the middle part of the sword because of the swift step he took. And because he caught it with a small force, as if slapping a mosquito, his hands were not cut as mentioned earlier. And the opponent lost his balance from the kick, enabling the sword to be twisted. As a

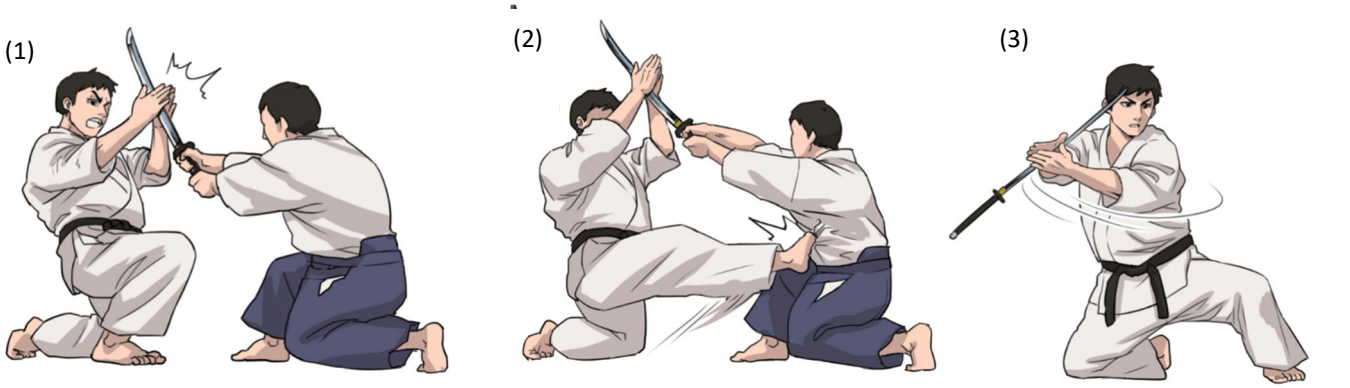
result, he could seize the sword easily.

But even these agreed-upon procedures can lead to failures due to small mistakes in timing. I've heard stories about other people trying the same techniques and injuring their palms.

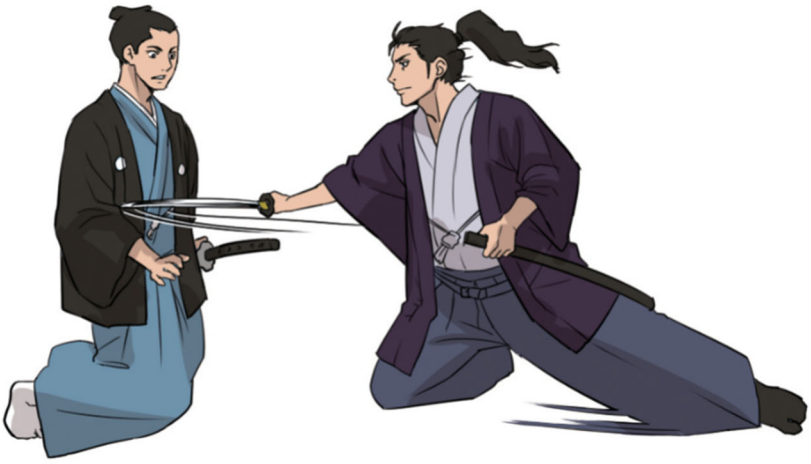
In an actual fight, your opponent may pull his left leg back to keep you away and possibly try to cut you sideways while drawing a sword. Thus, you cannot step forward and use your hands to reach the middle part of the sword. The moment the sword is drawn, it has an extremely high velocity. Catching the sword between your hands is practically impossible.

Lastly, I will introduce some more practical ways to catch a sword. In a fight with real swords, to block an attack that has too much force, if you grip your handle as you normally would with both hands, you may lose your balance and control of your sword. You need to do it as shown in Illustration 2. In the next moment, grip your opponent's sword from the back side as you run your left hand along your sword, shift the sword's point to the left, and aim for the neck or other parts and attack. This technique is possible only because Japanese swords have single-edged blades.

Illustration 1 Catch the sword before it hits you.



The moment your opponent holds a sword he has drawn overhead, close the distance and as you catch the sword between your hands, kick his stomach to push him away.

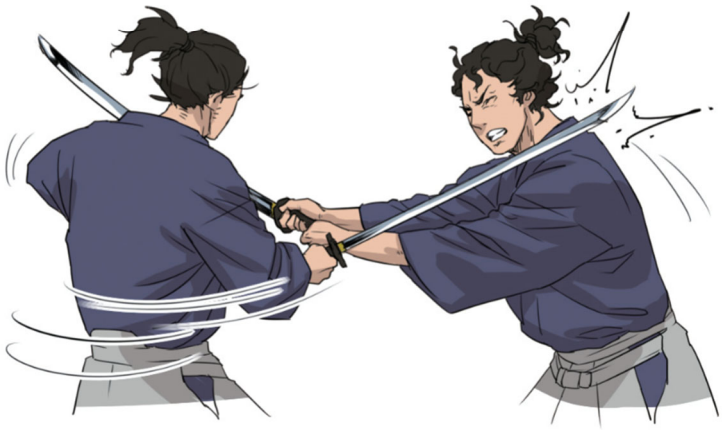


If your opponent tries to cut you sideways after drawing a sword with his left leg pulled back, Shirahadori is impossible.

Illustration 2 In a real fight, you can grab the blade.

Block the opponent's sword with your sword using your left hand to support it.

Grab the sword with your left hand (at a spot close to the tip of your sword) and shift it to the left. Also pull on the sword.



Attack as you return your waist from right to left.

Question 18
What are the dynamics when you block your opponent's sword strike with your own sword or with a push?

When opponents clash swords with each other, or push or sweep away their opponent's weapons, the forces in play are as shown in Illustration 1. However, your sword is basically in a state without momentum. The impact force of the attack is not included. Illustration 1 shows the direction of the sword movements. It is the same when slashing sideways. The weight of the sword itself is not included in the calculation.

As in Illustration 1, when holding a sword in a regular style, to lower the tip of the blade, F_R, (the force used to pull down) acts on the lead right hand gripping the handle, and F_L (the force used to pull up) acts on the rear left hand. It may look useless, but if the force on the left hand acts downward, the handle of the sword will only move downward at point C as the center of an arc, and you cannot counter f, the opponent's force. You counteract the force of your opponent using the difference between the two hands, as shown in formula (2) *1.

*1: The calculation in this section includes the principle of leverage.

The length of the handle is about 25 cm. l in Illustration 1 is about 20 cm considering the distance between two hands at their greatest distance. Suppose the distance L between your right hand and the opponent's sword is 60 cm, and the force f from your opponent is 10 kgw*2. Based on the formulas (1) and (2), $F_L = 30$ kgw, and $F_R = 40$ kgw. If the point C is close to the handguard and $L = 30$ cm, $F_L = 15$ kgw, and $F_R = 25$ kgw.

*2: 1 kgw (1 kilogram weight) is the force of 1 kilogram, which is the force exerted when a 1 kg object is at rest on a surface.

In this manner, if you want to apply force to your opponent with the blade of a sword, you should block your opponent's sword at a point close to the handguard and apply force to the spot close to the tip of his sword. In this way, you will obtain an advantage over him.

Next, I will introduce Gasshi Uchi of Yagyu Shinkageryu, an advanced technique based on this principle. There are other schools that employ similar techniques.

In in Illustration 2, A on the right swings his sword from above, while B does the same, only a second later. As a result, B blocks A's sword at around the middle part of the sword, at a point close to his own handguard. B applies force to his sword when swinging straight down, but slightly further back. A's sword is repelled and swings through the air*3. At the same time, B's sword stays almost on the same track, being able to cut A.

*3: Body handling in Illustration 3 of Q20 is developed based on this.

It goes without saying, but swinging a sword down a second after your opponent with the right timing is difficult. If you are a bit late, you will be struck first. Also, to keep your sword on the right track while repelling the opponent's sword sideways, you need to grip the sword softly yet tenaciously and use your whole body.

I had an opportunity to see demonstrations of this technique using real swords with non-cutting edges*4 by experts in Onoha Ittoryu. The moment swords clashed against each other with a clanky metallic sound, one sword was repelled and the other came to a dead stop right above the other's head. This technique cannot be mastered without exceptional mental strength, not to mention training.

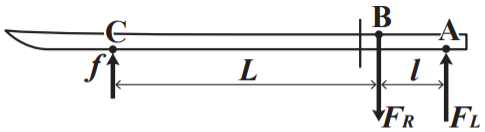
*4 Break a sword so that it has a non-cutting edge.

Though it is true that blocking at a point closer to the handguard gives you more advantages, you counteract the force using only the difference between the right hand and the left hand. When *f*, the force from the opponent, is large, you cannot handle your sword with the same grip as usual.

To oppose a large force, place your other hand (usually the left hand) not on the handguard but on the back side of the blade to support the sword as in Illustration 3. As in the formula (3), you can use the sum of force from both hands, and this way you can even counteract an enormous impact force. For example, suppose L_L = 30 cm and L_R = 40 cm, and the opponent applied force f = 70 kgw, produced by placing his whole weight on it. You can counteract this force using relatively small forces, F_L = 40 kgw and F_R = 30 kgw.

Use your arms flexibly like cushions and take your time in blocking your opponent's attack from a heavy weapon like a halberd, as the force *f* will not be so large (Illustration 4). The opposite approach, e.g., blocking instantaneously by thrusting both arms, would only increase the impact force, and your sword may break depending on the weight and momentum of your opponent's weapon.

Illustration 1 Force on the sword when clashing with another sword

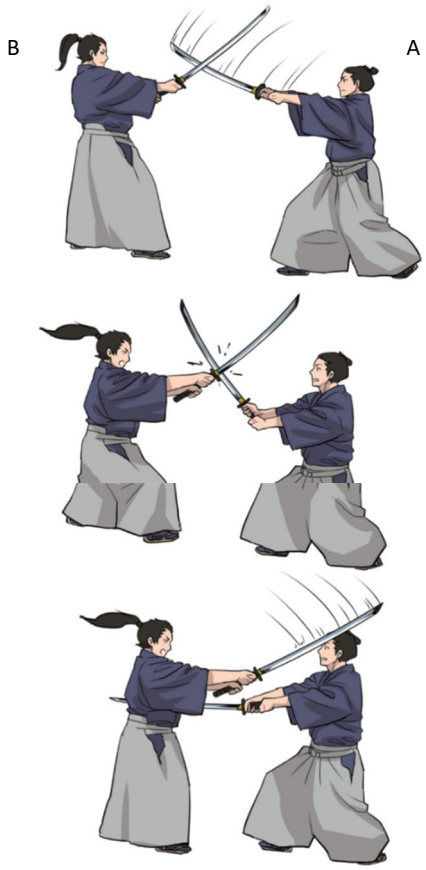


$$f = \frac{l}{L} F_L \qquad (1)$$

$$f = F_R - F_L \qquad (2)$$

Point A, B, and C are respective points of action.
F_L: force pulling up the handguard with left hand
F_R: force pushing down the handguard with right hand
f: force from the person in contact (sword, etc.)

Illustration 2 Gasshi Uchi of Yagyu Shinkageryu

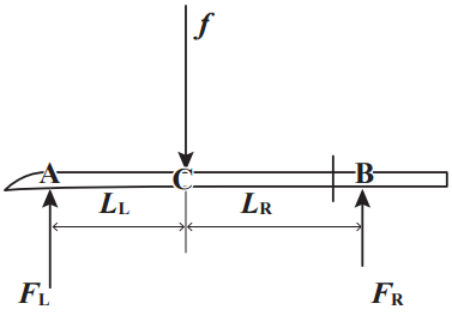


Person on the right (A) swings his sword from above the head, and a moment later the person on the left (B) swings as well.

Because B is a moment behind, B blocks A's sword at a point close to his handguard and is easily pushed down toward the back.

B swings down his sword. The sword of the person on the right faces the back and cuts through the air.

Illustration 3 How to counteract a strong force from an opponent

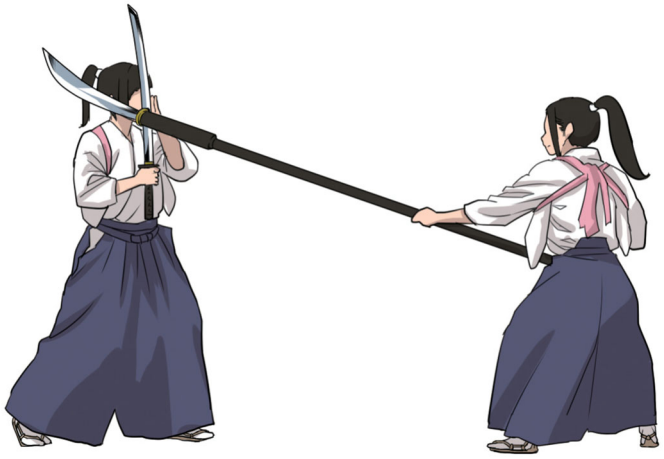


$$f = F_R + F_L \qquad (3)$$

$$F_R : F_L = L_L : L_R \quad (4)$$

By supporting the blade from the back side of the sword, you can counteract a large force.

Illustration 4 You can handle your opponent's heavy weapon



Use the whole area of your left palm to support the side of the sword against the momentum of a heavy weapon like a halberd.

Question 19
In samurai dramas, they strike others with the back of their sword. Does that happen in real life?

In Samurai movies, the expert swordman beats back swarming enemies and says, “Don’t worry, they’ll live. I just hit them with the back of my sword blade.” It may be good that unnecessary killing has been avoided, but actual swords fights are not that easy.

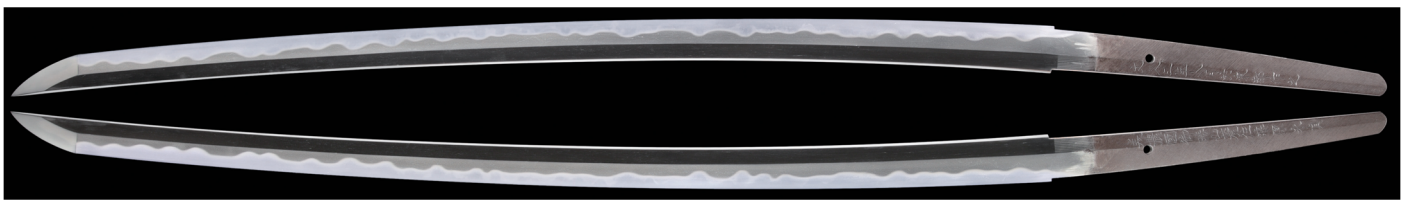
If you turn your sword to show them that you will only use the back side of it, they will feel at ease and try to attack you. A sword turned to use the back of the blade has a reversed curvature and poor usability. With it, you cannot block in the way shown in Illustration 4 of Q18, and you cannot show your true abilities.

To do this, however, you hold the sword with your usual grip. When you are sure you can cut your opponent and right before the sword touches him, twist your left hand to turn the sword. This way, the opponent thinks he is cut and collapses or faints due to the shock.

Even skilled swordsmen capable of attacks with the back of a sword have other problems to resolve. An incomplete turning of a sword may hit the side surface, causing the sword to either bend or break. Even if it’s not broken, a bent sword will make you feel there is obviously something wrong with it. Even I’ve experienced this feeling when I swung a sword. A sword in that state will not perform as intended.

But what if you strike with the back of a sword while keeping the blade standing? As in Q41, a sword bends a lot when striking an object. The contractile force on the blade and tensile force on the back of the blade are generated. A hard and fragile blade is resistant to contraction, and the back side of the blade is made of strong iron. In striking with the back of a sword, tensile force is generated on the blade. There can be exceedingly small notches on a blade, and this tensile force will cause cracks that eventually break the sword.

A Japanese sword has a specific curvature.



The sword in the photo was made by Okachiyama Eitei, who was patronized by the government and active in the late Edo period. The length of the sword is 77.3 cm and its curvature is 1.5 cm.

Photo by Tsuruginoya

Question 20
What is the point of striking your enemy's sword?

Holding a sword right in front of your opponent is the standard posture. With a sword, you not only cut but thrust, so it is necessary to remain in the center. You block attacks and make the first move to create a chance to attack.

There are two directions in blocking: up and down and sideways. Blocking diagonally is a combination of the two. As shown in Q18, you make a blocking motion by moving your hands in the opposite directions. Moving in the direction with strong force can enable a position that holds an advantage over the other. In conclusion, when standing right in front of your opponent, you can

1. **Block vertically with a strong force**
2. **Block sideways with a weak force**

The same holds true for other weapons.

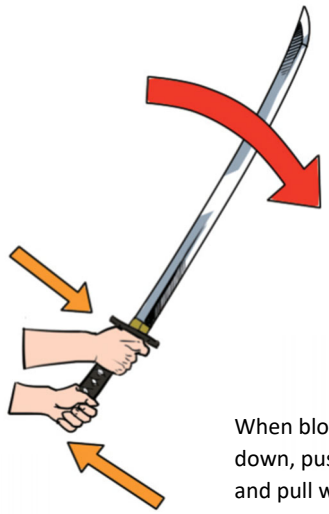
When pushing down the tip of the sword while standing at a slight angle to a horizontal line, apply a pushing force on the lead right hand, and a pulling force on the rear left hand (Illustration 1a). To block to the right, the force on the lead hand faces right and the force on the rear hand faces left (Illustration 1b). Let's look at the force that arms can generate.

If you have experience working out, you probably know this well, but the force needed to pull your arm towards your body is large (Illustration 2a), and the force needed to swing your arm sideways is small (Illustration 2b). In the same way, bench pressing requires far more force than dumbbell flies (the exercise shown in Illustration 2b performed while lying down on a bench), which require you to pull your arms together sideways.

This shows that you have a clear advantage over your opponent when you block him from a sideways direction using vertical force. According to this principle, the person on the left in Illustration 3 is maintaining a posture in which his sword is on the opponent's sword. In this situation, there is nothing the opponent can do, and the attack is one-sided.

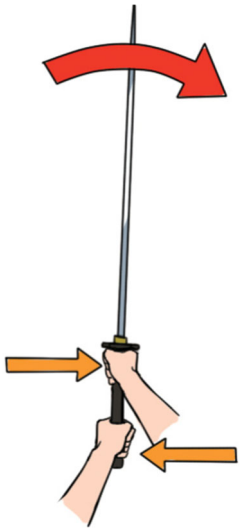
Illustration1 Force applied while pushing down and blocking

(a)



When blocking by pushing down, push with right hand and pull with left hand.

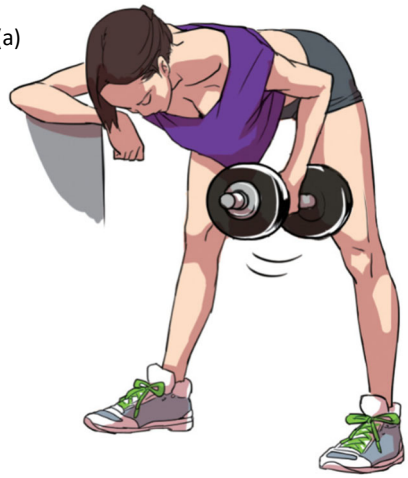
(b)



When blocking to the right, your right hand moves to the right and your left hand moves to the left.

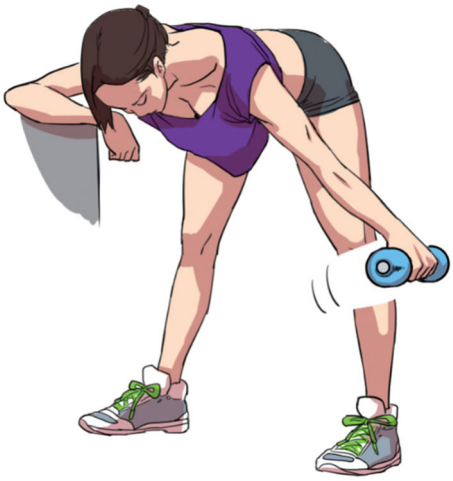
Illustration 2 Easy-to-use strength, and hard-to-use strength

(a)



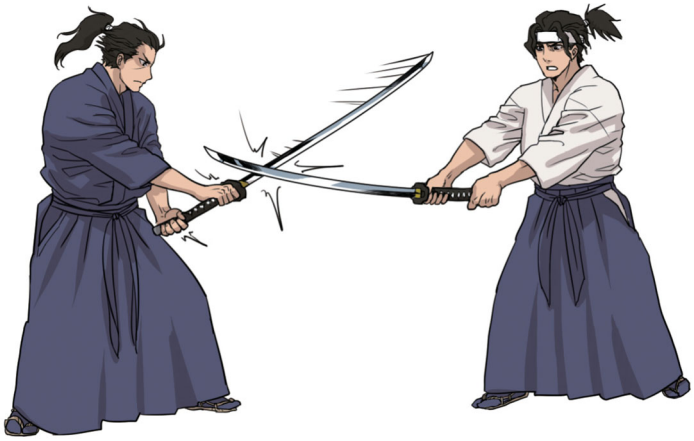
The force needed to pull your arm towards your body is large.

(b)



The force needed to move sideways is small.

Illustration 3 Dynamically, the person on the left is at an advantage.



The person on the left holds down the sword of the person on the right from a sideways direction using vertical force.

Question 21
Does the principle in Q 20 apply to swinging a sword?

Considering the explanation of Q20, you can swing a sword from above head straight down with a powerful force but doing that sideway does not sound strong enough. However, what I mentioned in Q20 is regarding blocking movements from a posture right in front of your opponent.

As in Illustration 1, when swinging a sword horizontally from left to right, the hands do not move much sideways. To the body, the right hand is pushing, and the left hand is pulling. You also turn your waist (of course, together with the upper body) to the right, and for that the muscle groups in the legs generate huge power. It's the same thing as turning the waist when swinging a baseball bat.

You turn your waist unconsciously when you swing a sword vertically. For example, as in Illustration 2a, starting from a posture with your left leg and left shoulder placed in front, push the handguard with your right hand and pull with your left hand to swing down a sword vertically. When you do this, your rear right leg takes a step forward, creating a posture with your right shoulder placed in front and the left shoulder placed in rear, as shown in Illustration 2b. The right arm moves forward against the body and the right shoulder, which is the base of it, comes forward. The handguard can be pushed forward with a powerful force. At the same time, the force pulling the left hand will also be strong.

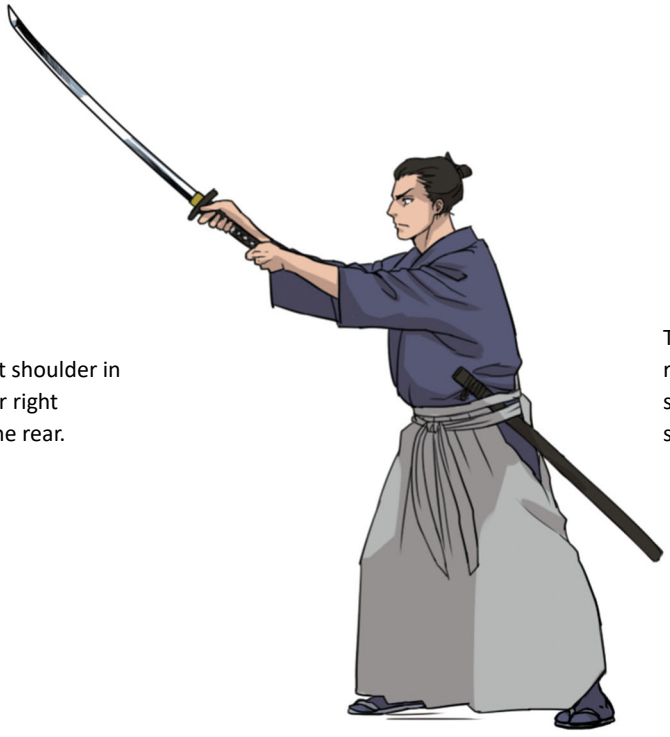
If you are at close range to your opponent, you can reposition your legs on the spot, and if your opponent moves quickly towards you and gets too close, you can keep your right leg as is and pull the left leg away to reposition your shoulders. This movement, in short, just turns the waist using the power of both legs and transmits the energy to the shoulders, in the same way as slashing sideways.

However, if you consciously try to turn your waist, your opponent will notice. You should instead imagine you are just repositioning your shoulders into a straight line. Your movement will be quicker that way and your intentions less easy to read. (You make yourself not felt.)

Illustration 1 Slashing sideways (further into the background) from left to right

Illustration 2 Reposition your right and left shoulders placed in the front and rear, and swing down the sword with a powerful force.

Place your left shoulder in front and your right shoulder to the rear.



Take a step forward with your right leg, and swing down the sword as you move the right shoulder forward.

Question 22
How can you gain an advantage over your enemy when pushing each other's swords?

Tsubazeriai means blocking your opponent's sword from the handguard and pushing each other, including a case in which the swords are crossed and pushing against each other. If you are pushed off, you will lose balance, and you may be cut on the neck or shoulder, or slashed by the sword as it is swiftly pulled away. In samurai dramas, both sides push each other furiously with much strength in their shoulders. In this style, the one with the most strength holds the advantage. Not just for Tsubazeriai, but in general it is important to stay aware of your central axis line. Here I will introduce two techniques I learned from Yoshiyuki Kono's sessions on dynamic movements.

1. **Hold the handle of your sword tightly against your body together with your arms. Push down your opponent's sword with your muscles.**
2. **Pull your sword and unweight your rear left leg* at the same time, then as you lift your right knee high up, slash the opposite side (e.g., your opponent's wrist).**

*To remove all your strength from your legs, which usually support your weight.

To keep your opponent's sword away from you, you will unconsciously flex your arms and extend them. However, with extended arms, as the contact point of the swords is farther away from you, the sideways force becomes smaller. To the contrary, in case 1, you fold your arms and keep them close to your body. One hand firmly grips the handle, and the other smoothly turns the handle.

You can pull your arms as you make it look like you are losing and entice your opponent to come closer to you, but he may get suspicious. In such a case, leave the contact point as is, and go closer to your opponent and pull your arms at the same time. This way you can push down your opponent using the powerful force generated by moving your body sideways and diagonally forward. (Illustration 1)

Case 2 is a technique similar to the retreating wrist strike in Kendo. (Illustration 2a)
Suppose your sword is to the right of your opponent's sword, and your right leg is placed in front. At first, unweight your rear left leg for a moment. With the help of your opponent's push, your body starts rotating around where your right leg stands, as if falling back. Transfer the rotating momentum to your arms and instantly pull back your sword. You can pull your sword until it is no longer crossing your opponent's sword.

When you unweight your left leg, make sure you don't kick downward to the ground. What is worse, if you consciously try to kick downward, you try to put weight into your kick using a backwards reaction. This will slow down your movement. At the same time, as you unweight your left leg, your right leg with your entire weight leaning on it automatically kicks the ground. To the opponent, it feels as if the sword pushing him has disappeared for a moment.

In the meanwhile, slash the opponent's right shoulder (to your left) by pulling your sword swiftly. But there are two problems. One is that the distance is too close. And the other is that, because your body is rotating backward, it is hard for you to swing down your sword.

You can solve these problems all at once by lifting your right knee. (Illustration 2b) Do not use your left leg as a spring to lift your knee while bending backward like a knee strike. Do not worry about your left leg. Just lift your right knee and the right shoulder as if they were attracted to each other.

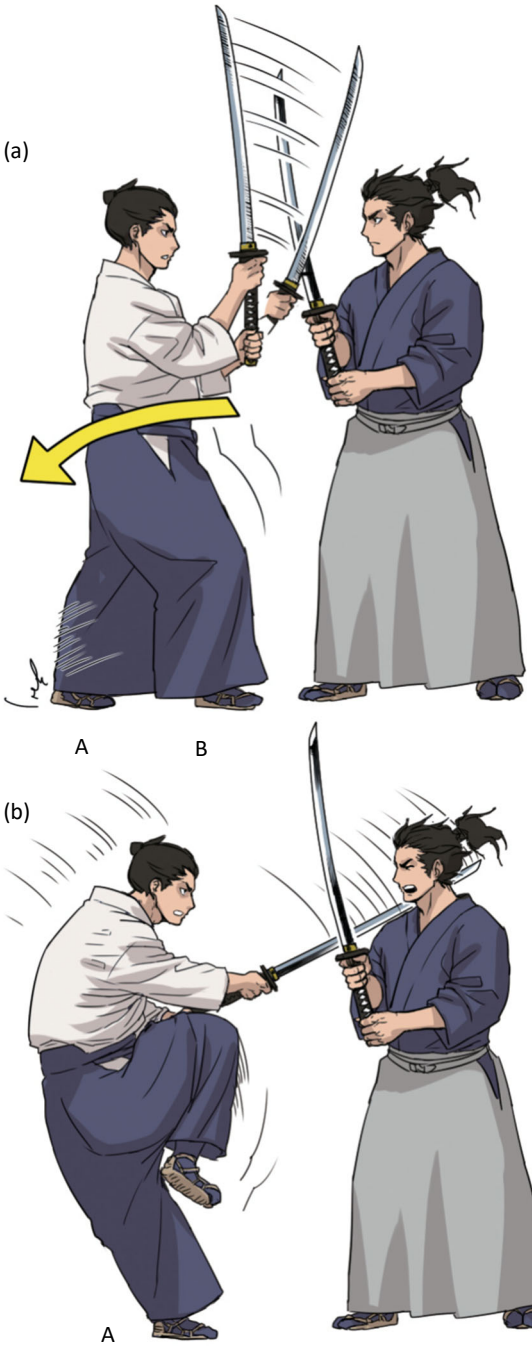
Then, the center of gravity will shift to the rear left leg, and the waist is naturally pulled back. This creates a space for you to swing the sword down. On a chair that swivels, swinging both arms to the left gives a rightward spin to the chair, along with you in it. According to the same principle, suddenly lifting your right knee (backward rotation around where your left leg stands) not only stops the backward rotation, but your body starts rotating as if falling forward. If you put the momentum of this rotation from your arms onto your sword, you can quickly swing down your sword. The opponent feels like the disappearing sword has appeared on the opposite side and attacked.

Illustration 1 Winning Tsubazeriai 1

When pushing each other's swords with force, the side with greater strength wins.

Person (on the right) gets closer to the opponent. At the same time, he pulls in his arms and holds the handle against his body.

Illustration 2 Winning Tsubazeriai 2



1. Unweight the rear left leg A
2. The body gets into a backward rotation around the lead right leg B
3. Use the momentum of the rotation to pull the sword. (If the sword is pulled quickly, the rotation in 2 will be barely generated.)

1. Stop unweighting the rear leg A, and at the same time, lift the right knee.
2. The rotation of the body is reversed and recentered on A.
3. Using the momentum of the rotation, swing the sword.

Question 23
When slashing with a sword, why do your hands roll (or rotate) in opposite directions?

One reason is to stop it all at once. If an unskilled person swings a heavy sword as if it were a bamboo sword, he may apply too much strength and cut his own knee or floor due to the excessive motion. It will lead to defeat or death in an actual fight. Gripping hard as you bend your wrists backward like wringing water out of a towel is called Chakin-Shibori. Not only the wrists but other muscles in the arms, shoulder, chest, and back are used to stop a sword instantly at the intended position.

A second reason is that, as is mentioned in another section, the blade may be kept standing (refer to Q36) at first, but it often cannot be kept at a right angle while cutting something. From that moment, it won't cut well, and it may also break or bend. Chakin-Shibori is a way to keep the sword resistant to impact from objects and to make sure the blade is in the right position all the way. Gripping the handle of a sword with excessive strength is called kuso (Shit)-nigiri. With that grip, you may be able to cut a straw post once, but not several times in succession from various angles because your wrists are stiff. You must grip and handle a sword softly and freely and fix it with Chakin-Shibori only at the moment you swing it (Illustration 1).

Here, you may have a question about whether squeezing both hands in opposite directions cancels each other's force and fails to keep the blade standing. However, please look at how the velocity of muscular shortening and the generated force are related. (Illustration 2) When the velocity of shortening is negative, in short, when the external force is too strong and the muscle gets extended conversely, an exceptionally large force is generated. When the blade almost veers to the right, the left-hand muscle resists with a large force using eccentric contraction. The right-hand muscle towards the right (the same as the external force) gets weaker because of contraction with shortening*. This mechanism automatically keeps the blade standing.

*In reality, the skin of the right palm pulled in the direction of the fingers becomes loose, so the force gets smaller.

Illustration 1 Gripping a Japanese sword requires technique.

Grip softly and handle.

Grip harder the moment you swing it.

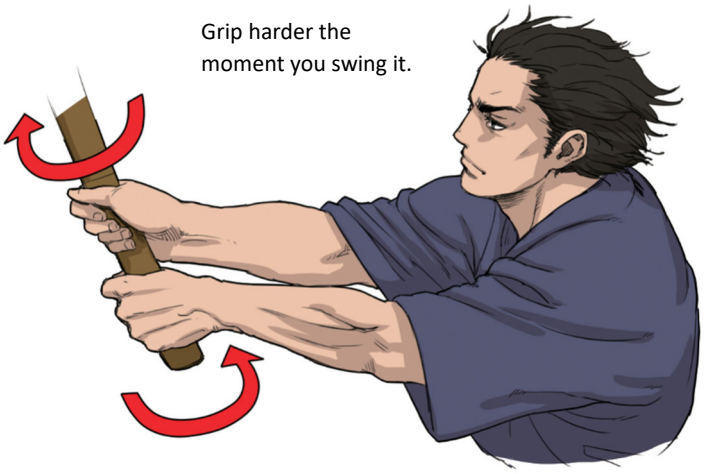
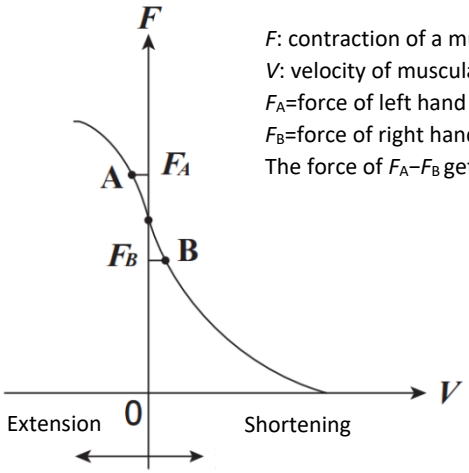


Illustration 2 Force of gripping with both hands when the blade almost veers to the right due to the force it is contact with



F: contraction of a muscle (force squeezing wrists)
V: velocity of muscular shortening
F_A=force of left hand returning the blade to the left
F_B=force of right hand making the blade veer further to the right
The force of $F_A - F_B$ gets the blade back to the left.

Squeezing left hand

Squeezing right hand

Question 24
I understand the meaning of Chakin-Shibori, but can enough power be generated only by the wrist muscles alone?

In many schools, they keep the blade standing from the beginning when swinging a sword. However, in Yagyu Shinkageryu, first they insert a sword into vital points such as the nape of the neck or the joints of armor, then make the blade stand and cut by pushing or pulling. It takes almost no momentum to swing a sword, but if you grip correctly and do Chakin-Shibori properly, you can cut due to the great sharpness of a Japanese sword and the large force.

This method is also used for breaking your opponent's balance with a sword. The expression of Illustration 1a is slightly exaggerated for better understanding, but it shows a moment of lightly hitting the handle of the opponent's sword with the tip of the sword gripped softly between the thumbs and palms*1. In trying to hit a person, your opponent often notices in advance because you produce a back reaction, overexert yourself, and take too much time building momentum. Putting a hand on someone lightly, like touching the shoulder of someone close to you, cannot be easily prevented. Hitting with a sword is the same.

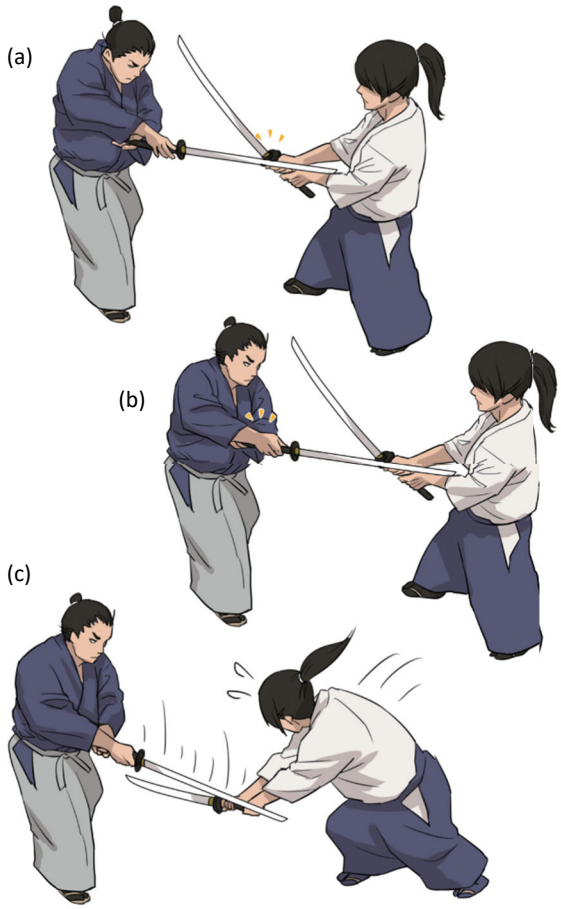
*1: It is the same when you hold your wrist over armor with a real sword.

If the sword hits the spot you aim at, start Chakin-Shibori as in Illustration 1b. Use the extending force of your arms as if wringing water out of a tea napkin (or a towel for a man of the present age). Big and strong muscles such as the greater pectoral muscle that moves the arm inward (horizontal flexion), the front part of the deltoid muscle, and the triceps brachii that extend the elbow are used (Illustration 2) *2.

*2: When you push down a sword as you pull to make your opponent fall forward, you also use the latissimus dorsi.

As the arms are extended, the hands gripping the handle naturally start squeezing it. The wrist muscles do not bend the wrist backward (dorsal flexion) voluntarily. Rather, they exert a large eccentric contraction force as in Illustration 2 of Q23 to endure as much as possible the bending inward (palmer flexion), losing to the extending force of the arms. The opponent falls forward (Illustration 1c) due to the sword being subject to the eccentric contraction force. And the power came from the large muscles in the chest, shoulders, and arms.

Illustration 1 Apply pressure by chakin-shibori*3.



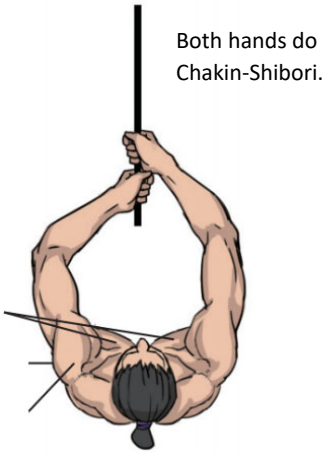
Hold the handle of your sword softly and lightly hit the handle of your opponent's sword.

Apply pressure as you keep the blade of the sword standing by Chakin-Shibori.

The opponent falls forward.

*3 Illustration of the performance of the expert Makoto Okamoto

Illustration 2 Movements of your body in doing Chakin-Shibori

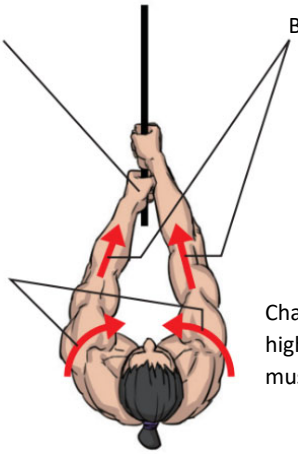


Both hands do Chakin-Shibori.

Greater pectoral muscle

Triceps brachii

The front part of the deltoid muscle



Both elbows extend.

Upper arms (shoulder joints) bend horizontally.

Chakin-Shibori requires high energy from big muscles extending arms.

Question 25
How is the art of fencing different when wearing armor vs. regular clothes?

Fighting in armor, as in the period of the warring states, is called Kaisha Kenjutsu*1, and fighting dressed in ordinary clothes, as in the Edo period, is called Suhada Kenjutsu.

*1 Kai means shell and refers to armor.

Clothes, even thick ones have no protection against a sword. If you are dressed in ordinary clothes, your whole body becomes a target. On the other hand, swords cannot cut through armor or Kabuto (decorative samurai helmet). You can block the opponent's sword with your forearm and counterattack, or intentionally let him hit your helmet to break the sword. To beat an enemy wearing armor, you must aim for the exposed face, the neck area where the armor is thinner, the back of the knees, etc., or cut your opponent's armpit or groin upward from below. (Illustration 1) Cutting an artery at the armpit or groin can cause massive bleeding.

There is a difference in gross weight between Oyoroi (large armor) (from the Gempei period to Kamakura period) and lightweight Toseigusoku (modern armor) *2 of later times, which weighs as much as 20 kg to 30 kg. Unlike Suhada kenjutsu, it is impossible to swiftly move around in armor, and you just keep your body down in a stable posture. Only several spots can be cut, attacking randomly most likely misses the target and is useless.

*2 It refers to modern armor, as distinguished from old Oyoroi (heavy armor).

For that reason, there are other methods such as Tsubazeriai for situations where bodies are in touch, you break the opponent's balance, and insert a sword through gaps in the armor to cut his neck. The technique to break the opponent's balance has something in common with Suishu of Tai Chi. It is not a simple push using muscles while standing firm with both legs, but it is done flexibly using the hip joint (actually, the knees and ankles as well), shifting the position of the waist, and fending off the force from the opponent using the upper body to break his balance (Illustration 2). In addition, pushing the opponent perpendicular to the line connecting his feet requires a smaller force.

And as a more advanced skill, when the opponent blocks your sword at the forearm as mentioned earlier, you can skillfully maneuver your sword to bring him forward (front side of the line connecting both feet) *3.

*3 Refer to Illustration 1 of Q24.

Illustration 1 Weak points of armor

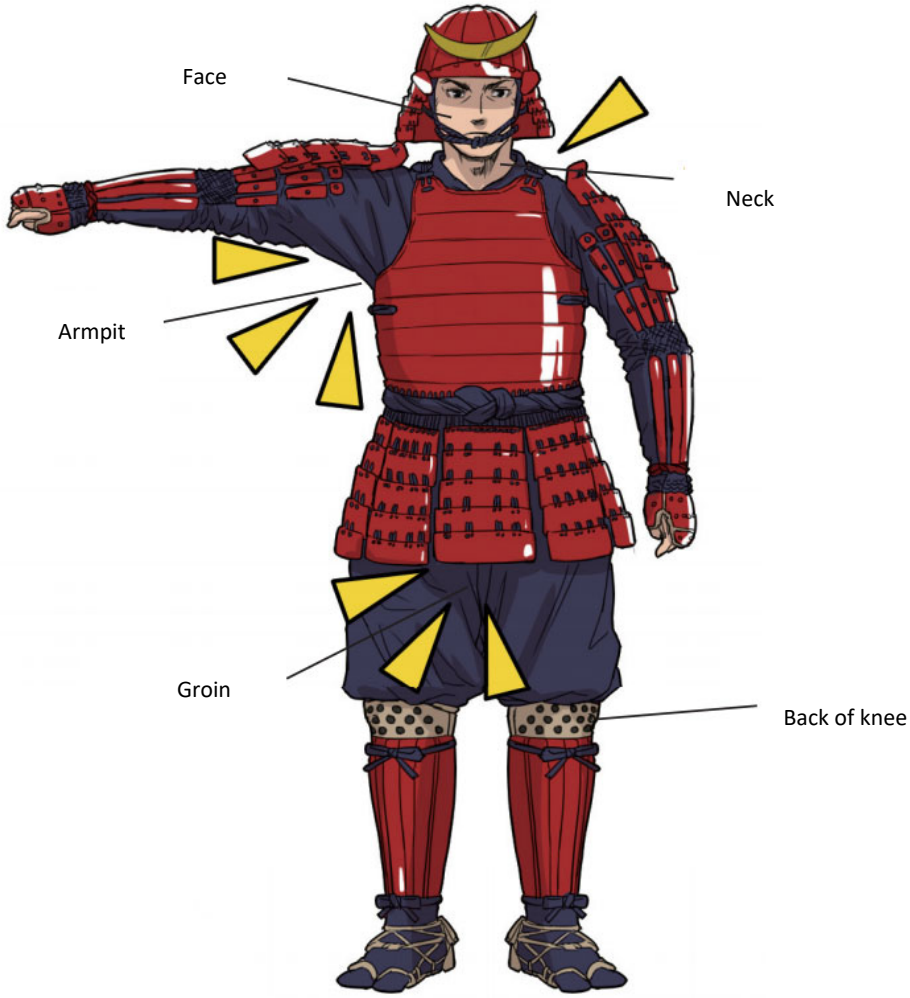
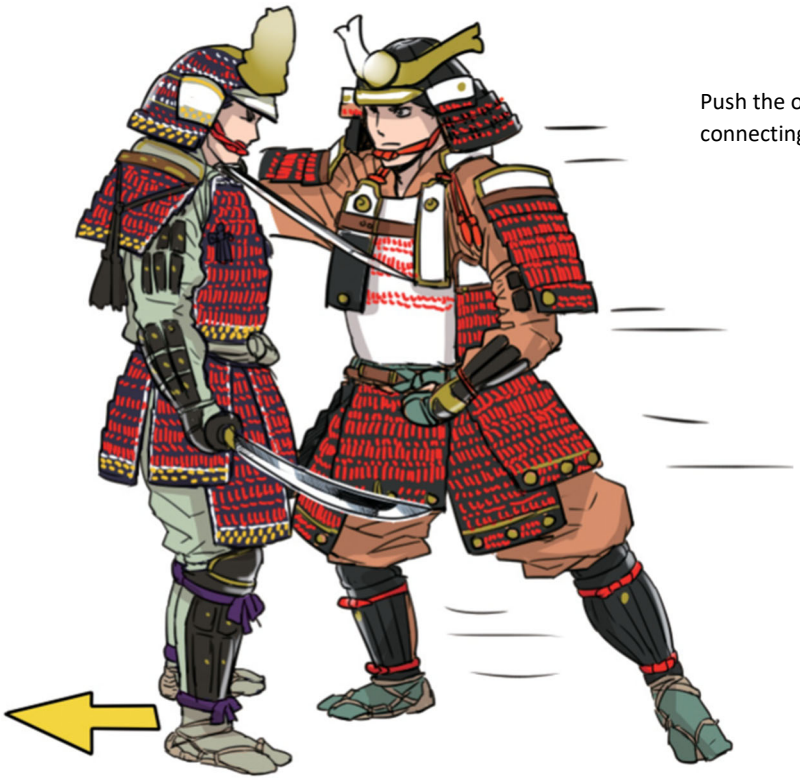


Illustration 2 How to defeat an opponent wearing armor



Push the opponent vertically to the line connecting his feet.

Question 26
What is a way to softly fend off a sword while being attacked?

You are facing an opponent right in front of you, with your right leg placed in front. Suppose he is trying to swing a sword from above (Illustration 1a). Blocking the sword squarely may nick your sword or break it if the opponent's sword has a lot of momentum. I will describe how to softly fend off a sword in this situation.

Bring your rear left leg forward slightly to the left at the same time as the attack. The distance you move depends on the range between you and the opponent. Simultaneously, swing up your arms (moving to the left), gripping the handle of the sword softly right above your head (Illustration 1b). Your sword naturally gets in a position needed to protect the right side of your body, and you can fend off the opponent's sword diagonally using the side of your sword. In the next moment, swing the sword down to the right as your counterattack (Illustration 1c).

Let's look at the effect of this sequence in terms of dynamic force. As in Illustration 2a, suppose you block the opponent's sword at the velocity v (100 km per hour, for example, units are omitted hereinafter) at the angle θ (suppose this is 25°). However, the speed hitting the blocking sword vertically is, $v_1 = 100 \times \sin 25° = 42$, a lot slower. Besides, the blocking sword bends slightly, making the impact even milder. The velocity parallel to the sword $v_2 = 100 \times \cos 25° = 91$ is the speed running through the side surface of the sword and is not an impact force.

As in Illustration 2b, the blocking sword moves by the force of stepping forward to the left at V(=10), the angle θ gets smaller θ', and that makes it easier to fend off the sword. The result is $v_1' = 38$, with calculations omitted.

The opponent's sword is used fiercely, and ground iron powder generated by friction literally gives off sparks during the fight.

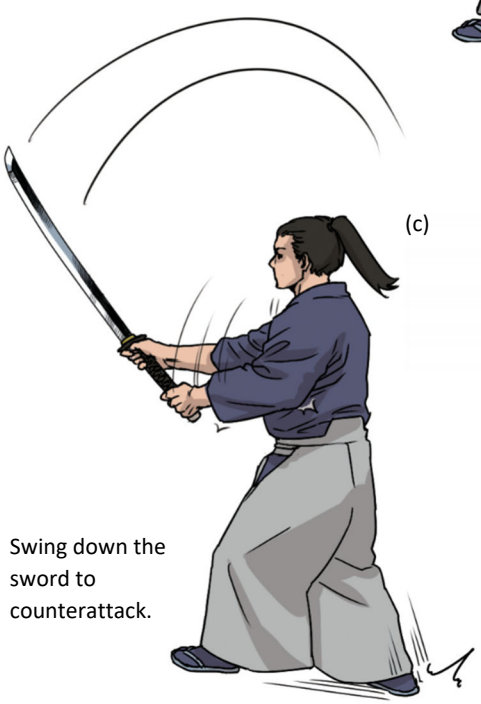
Illustration 1 Swift sword techniques in old school Kenjutsu

(a)

Place your right foot in front.

(b)

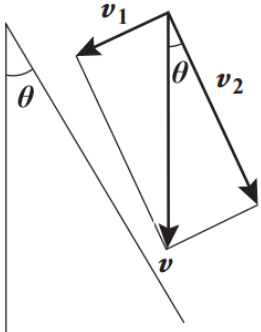
Fend off the sword coming down from above the head to turn aside as you bring your left foot forward to the left.



(c)

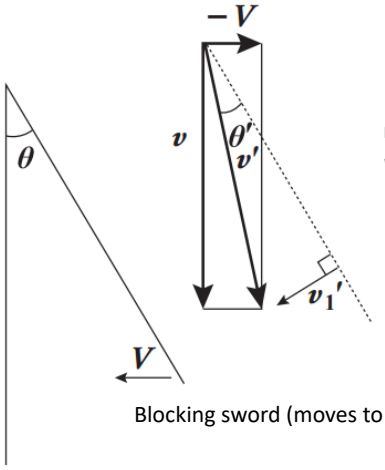
Swing down the sword to counterattack.

Illustration 2 The reason the impact is reduced



Blocking sword (still)

$$v_1 = v\sin\theta$$
$$v_2 = v\cos\theta$$



Blocking sword (moves to left)

V: velocity of the blocking sword moving to the left
v': velocity of the opponent's sword

v: velocity of the opponent's sword
v_1: velocity vertical to the blocking sword
v_2: velocity parallel to the blocking sword

v_1': velocity vertical to the blocking sword

Blocking only diagonally (a) is effective. If it moves to left (b), the angle θ gets smaller $\theta,'$ which makes it more effective.

Question 27
How dynamically effective is dual wielding combat?

Speaking of dual wielding, Miyamoto Musashi's Niten Ichiryu, a fighting style having a long sword in the right hand and a short one in the left hand, has become quite famous. But a question arises as to whether fighting with two swords is really possible. Musashi had over 60 fights and never lost, including one against Sasaki Kojiro. But some swordsmen say Musashi never actually used two swords because fighting with two swords is impossible. Putting that aside, let's think about the dynamics and whether one person can handle a long sword and a short sword together, and whether a long sword suited to be handled by both hands can be handled by one hand.

The following are the merits (1 and 2) and demerits (3 and 4) of dual wielding.

1. **With two swords, the defense range is wide.**
2. **You can do either offense or defense with two swords, or use one for offense and the other for defense.**
3. **You can apply only a small torque to the handle of a sword gripped by one hand, which is a disadvantage when blocking your opponent*1.**
4. **The velocity is lower when swinging a sword with one hand.**

*1 As for torque, refer to Q44.

As for point 1, Musashi's posture depicted in his portrait looks as if he is just standing with his swords hanging down (Illustration 3a), but his lower body is completely in the service of his defense. You can only attack his upper body. We can conclude he is steering enemies to his upper body.

As for point 2, when attacked with two parallel swords, it is hard to block them with one sword. Also, as in Illustration 1a, catching a spear in between two swords can also block sideway motions. A spear can come from above the head with powerful force. With two swords, you can block it diagonally with flexibility. (Illustration 1b) *2. By blocking it as you put two hands closer, the contact points of the two swords with the spear moves closer to the handguards. (Refer to Illustration 2 and 3 for the merits of blocking at a point close to the handguard.) Next, bring down the swords with the spear in between sideways (Illustration 1c). You can counterattack with the small sword while holding the spear down with the long sword (Illustration 1d).

*2 Refer to Illustration 2 of Q26

As for point 3, when gripping with one hand, the torque of swinging the tip of the sword sideways or vertically is small. But it becomes a lot larger with both hands*3. The maximum torque generated by one hand and by two hands are N_s and N_b, respectively. (N_s is much smaller than N_b.) When a person with one sword and a person with two swords block each other, surely one hand loses to two hands. However, if the conditions of the inequality (block the tip of the opponent's sword at a point close to your handguard) in

Illustration 2 are satisfied, one hand can win.

*3 Refer to Illustration 4 of Q45.

As for point 4, when swinging a sword, you can use the strength of your entire body including rotation of your waist, and the velocity can become high even with one hand. However, when you swing your sword to bring up its tip, the small torque explained in point 3 cannot generate a quick movement. You will realize this if you try swinging a baseball bat with one hand or swing it around only with the strength of your wrist (with one hand).

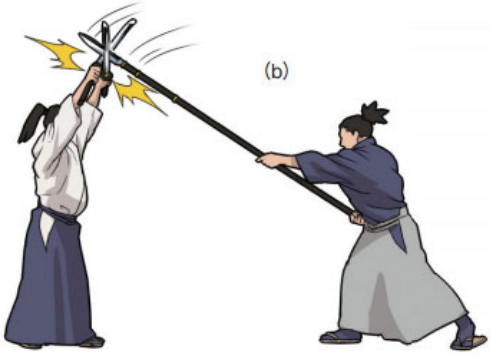
Next, let's look at examples of how to compensate for these demerits. (Illustration 3)
As in Illustration 3a, suppose the opponent on the right attacks your position (holding your swords low) by swinging his sword down from above his head. Fend it off by backing off and holding your short sword in your left hand. (Block the tip of his sword at a point close to your handguard) At the same time, lift your right hand holding the long sword (Illustration 3b). Bring it down while swinging it around (Illustration 3c). Use the torque on the wrist only to finely control the direction of the sword's tip*4.

*4 As in Illustration 1 of Q23, you don't always rely on torque, even with both hands.

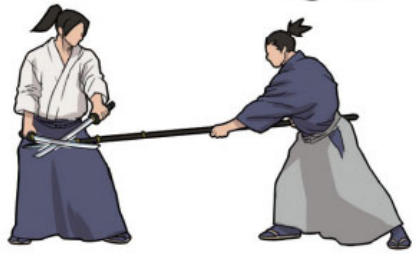
Lastly, if dual wielding was advantageous, everyone would do it. In reality, most people fight with one sword. After all, regardless of whether one sword or two swords are used, you should take advantage of your respective swords (Illustration 4).

Illustration1 Using the merits of dual wielding against a spear.

Catch and hold a spear attacking the chest with two swords. The spear cannot move sideways either.

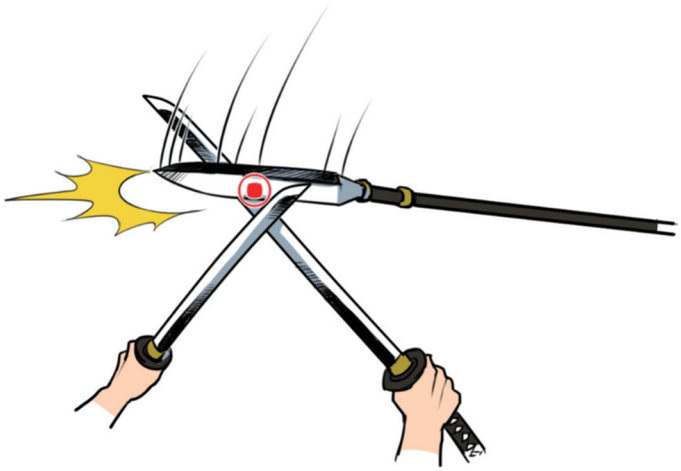


If attacked from above, with two swords you can block it well with great flexibility.

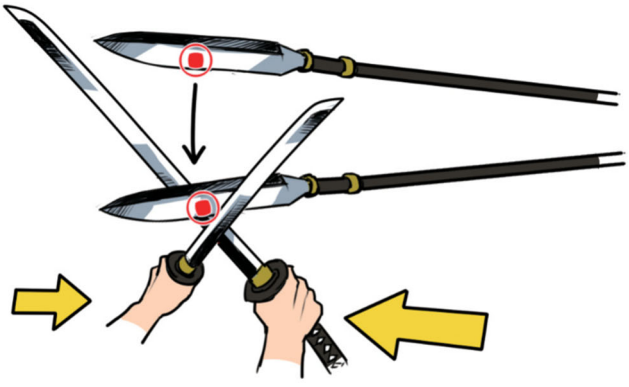


Bring down the spear you caught.

You can attack the opponent with a small sword while holding his weapon with your long sword.

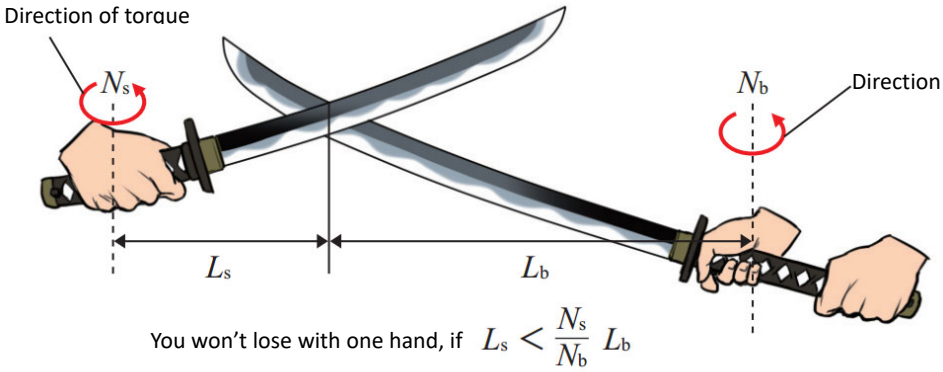


The spear hits both swords diagonally. The impact is smaller this way.



If you narrow the distance between your hands, the contact points with the spear move from A to B, allowing you to block the spear flexibly as if covered by a cushion. The contact point B is close to the handguard, so you won't lose to it.

Illustration 2 Not losing with one hand



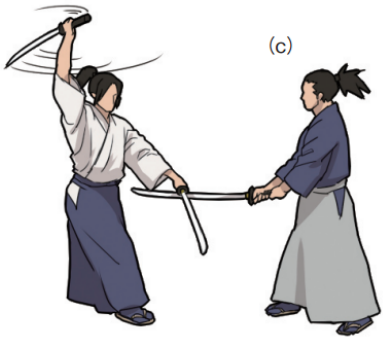
You won't lose with one hand, if $L_s < \frac{N_s}{N_b} L_b$

If you block the tip of your opponent's sword (L_b is long) at a point close to your handguard (L_s is short).

Illustration 3 How to handle a long sword with one hand

One person is in a posture holding his sword down. The other swings from above his head.

Fend off the sword using swift body movements, and raise your right hand while holding the opponent's long sword with your short sword held in your right hand. (The conditions of Illustration 2 are kept.)



Swing around the sword, and attack the opponent from above.

Illustration 4 What type of person is suited to dual wielding?

If you are strong and have a large build, you can swing two swords easily.

Question 28
How can you deliver a powerful blow and bring down your enemy using a bamboo sword?

In an actual Kenjutsu fight, when you hold your opponent's sword down with your sword, you have an advantage over him. To practice this technique, practitioners don't use wooden swords, but they do use bamboo swords for safety reasons.

In Yoshiyuki Kono's performance, people held up a bamboo sword horizontally over their heads with both hands holding each end. He then hits the bamboo sword, and most people were sent staggering (Illustration 1).

Thinking about what it would be like in a real fight, each swings a sword against the expert's. They fight as if slashing each other's neck, but he instantly overcomes his opponents.
Suppose the mass is 0.5 kg, and the velocity of the center of gravity is 30 m/s (=108 km/h), the momentum is calculated as 15 kgm/s using the same formula as in Q07. If this force hits the person in Illustration 1 (suppose his weight is 75 kg) directly forward and horizontally, the velocity of staggering backward is only, 15 kgm/s ÷ 75kg = 0.2 m/s. Also, in Illustration 2a, the opponent strikes in the opposite direction with his bamboo sword, and the forces are balanced and come to a halt. The heavy force needed to bring down the opponent is not generated.

The principle of striking is the same as a thrust that cannot be blocked in Q07. Instead of exerting all muscles to swing the light bamboo sword, one saves the energy of momentum from both arms and the body, which is a lot heavier than a bamboo sword*1 (Illustration2b). With the same energy, the momentum towards the opponent (= mass given to the opponent) is much greater.

*1 The velocity of a bamboo sword is slightly lower.

There are more tricks to transmitting this huge momentum to the opponent. As I explained in Q18, keep a wide distance between both hands when gripping the bamboo sword*2, and if possible, block the opponent's sword at a point close to the tip of his sword and at a point close to your handguard. And as explained in Q20, handle your body so that your bamboo sword moves vertically, a direction in which a bamboo sword can exert more force, and hold down your opponent's sword sideways to break him. (Illustration 2c)

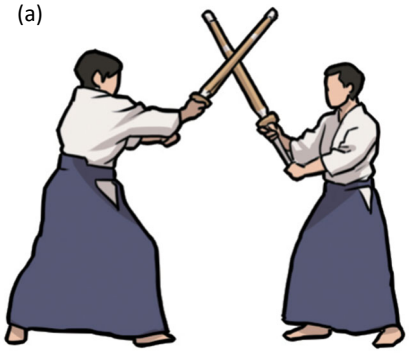
*2 This technique is not possible with one hand, in principle.

Illustration 1 You are not sure why you cannot block it.

In this state, you will be thrown by a bamboo sword, which is supposed to be easily blocked.

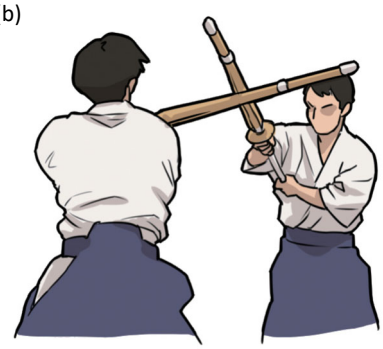
Illustration 2 Overcome the opponent through a heavy attack.

(a)



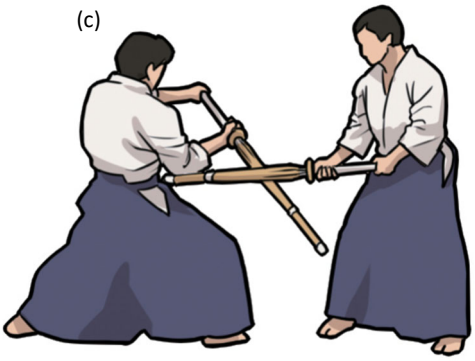
A fight between two bamboo swords usually stops at this stage.

(b)



Transmit the large momentum from the arms and body to the opponent's bamboo sword.

(c)



Using a point close to your handguard, push down the opponent' bamboo sword sideways with a vertical movement.

Question29
What is the secret of the Yakumarujigen School that has been handed down in Satsuma?

The Yakumarujigen School (also referred to as the Nodachijigen School) belongs to the same group as the Jigen School, which also originated in Satsuma (Kagoshima Prefecture). Their Kenjutsu is for actual fights, and they don't think about defense. Attacking is everything, and they throw everything at you, especially in their initial attack (Illustration 1). You deliver a knockout blow using a long and heavy sword called Nodachi, a battlefield weapon with a blade length of 90 cm or longer. The force is enormous. It is said a person tried to block it with an ordinary sword (over 70 cm), but the blow made his handguard push into his forehead and he died instantly.

Even Isami Kondo of the Shinsengumi was afraid of this style and told his members to avoid the first blow. A representative technique called Kakari is an attack from above. I will explain it from a dynamic perspective.

From a spot several meters away from your opponent, hold your sword high and vertically. Run as fast as you can towards him and to the right. Simultaneously, land with your right foot in front and stand firm. Standing firm accelerates the sword. The principle is as follows.

As in Illustration 2, when the lower end of an elongate object shifting to the left comes to a sudden stop, the velocity of the center of gravity becomes lower, but the upper part, on the contrary, is accelerated by the influence of rotation. This is the effect of creating a wall that I explained in my book *The Science of Combat Sports* (science-i). It is the same mechanism as in a javelin throw, where an athlete starts by running and accelerates the javelin held high by firmly planting his leg in front.

There are many points to swinging a sword straight down using the effect of creating a wall, and the first two points are about the lower body.

1. **Land the heel of your right foot first while keeping your waist facing front.**
2. **When landing, make sure that the line connecting the left foot to the rear and the right foot matches the direction of travel (Illustration 3).**

And the following four points are about using both hands to hold a sword.

3. **Hold the sword as high as possible.**
4. **Try to create a wide space between both hands when gripping the handle.**
5. **Do not put the left hand first when swinging a sword.**
6. **Keep the left elbow at the center axis line when swinging a sword.**

As for point 1, the purpose of putting forth the front foot is to create a wall as in Illustration 2, and it requires a firmness. Having the right waist move forward proves a lack of firmness and that the left knee is bending like a cushion. Apart from when you are running up to someone, landing with your toes makes

your ankle function like a cushion and cannot create a firm wall.

Point 2 is to create a simple vertical rotation. Ideally, the left foot, the center of gravity, and the left leg are on the straight line. The landing point of the right leg tends to be towards the right. This creates a clockwise rotation and steers the direction of the body with the left shoulder pushed forward, and you cannot swing a sword straight down.

Regarding Point 3, in Illustration 2, the higher point A is, the greater the distance from P, the center of rotation (= radius of rotation), and thus the velocity is higher.

As for point 4, to transmit a rapid twist of your body to the sword, the right hand exerts force pushing the handle and the left hand exerts force pulling it. The wider the space between both hands, the greater the torque to rotate the sword forward.* The calculation is slightly complicated, but please note that the wider the gap *b*, the greater the torque that rotates the sword forward. Without enough torque, the sword won't rotate forward, and the handle moves ahead first (Illustration 4).

*Illustration 3 of Q45 is a simplification of this.

Point 5 is a warning against the left hand being moved forward or pulled by the handle as a reaction to pulling the handle with the left hand (as I mentioned regarding point 4). For the first time when you maintain the position of the left hand, a large force can be exerted to pull the handle.

Regarding point 6, this teaching is called Sahisetsudan. Hi means elbow. If you are cut off at the elbow, you cannot move it. You must keep the elbow at the center axis line as if you don't have an elbow. In this way, the left arm and the sword are on a straight line, and you can swing the sword straight down. As a result, the left wrist that is easily cut gets under the sword, which is an advantage to you.

Illustration 1 How to take the first swing with a sword in the Yakumarujigen School

Transmit the body's vertical to Nodachi to rapidly accelerate it. You should feel that your weight is concentrated at the tip of the sword.

Swing the sword down the center axis line.

Convert the running momentum at the lead foot standing firm like a wall to a vertical rotation, and swing the sword down as you lower your body.

Illustration 2 Effect of a wall

When the edge B comes to a sudden stop at the wall of point P, the velocity of the center of the gravity G drops, but the upper part A is swiftly accelerated by the rotation effect.

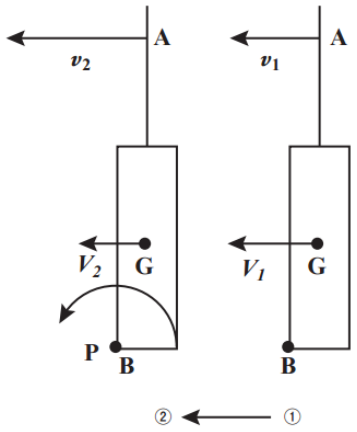
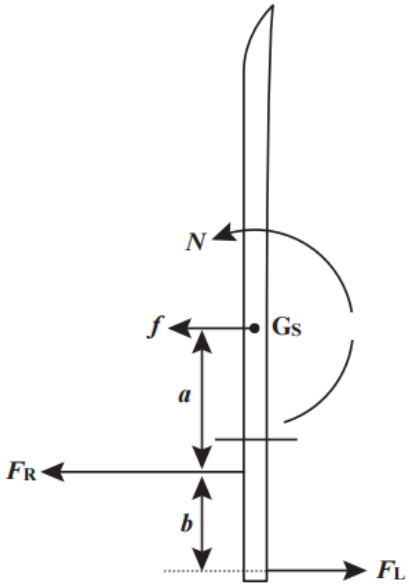


Illustration 3 Where to put the right foot

The right foot lands on B, in the direction of the center of the gravity, G. If it lands towards the right, as B,' a rotation is generated around B,' and the body turns right.

Illustration 4 The reason the sword is swung down with great force



The center of gravity of the sword
F_R: force pushing the handle with the right hand
F_L: force pulling the handle with the left hand
The difference of the forces between both hands at $f=F_R-F_L$, the center of gravity of the sword is accelerated.
Due to the difference in torque between the right hand and the left hand

$N=FL\ (a+b) - FR\ a$
$= (FL-FR)\ a+FL\ b$
$=fa + FL\ b,$

the sword rotates around the center of gravity.
When the distance between hands *b* is small, the torque N gets smaller, and you cannot swing your sword down.

Question 30
I want to learn more about the strengths of the Yakumarujigen School.

Another representative technique, contrary to Kakari*, an attack from above, is an attack called Nuki. You run close to your opponent with your sword in its sheath, and slash the groin area upward from below upon drawing it (Illustration). Generally speaking, attacks from above are obvious, whereas attacks from below are hard to anticipate. This quickly drawn sword is also hard to block.

*There is another Chinese character for this with the same pronunciation.

Nuki is the same as Kakari in that you change the running momentum to a vertical rotation. To slash upward from below, you put your right hand on the handle as you run close to your opponent and simultaneously flip the blade upside down. When you are in range, tilt your body forward, take a step with your right leg, then draw the sword along the center axis line. With a forward-bent posture, you can naturally draw your sword because the right hand and the left waist are kept away.

The moment you draw the whole sword out of the sheath, land the right foot and stand firm. Of course, make sure the right foot, the center of the gravity, and the left leg are on a straight line. The vertical rotation starts here, and the vertical rotation tilts the upper body forward even further. In short, at this point, the right arm or shoulder, located high, are rapidly accelerated forward, and that energy is utilized to slash upward from below. Just like with Kakari, the sword moves along the center axis line.
In both Kakari and Nuki, they give a high-pitched scream (called "*enkyo*") as they run toward their enemies, and attack with a momentum so powerful as to knock away the blocking sword. If hit, you will die instantly on the spot. Such fierceness must have scared their enemies to death.

However, if you fail to keep various points in mind because you hesitate or make a mistake in timing the landing of your right leg, you will miss your first blow. By polishing the necessary mental abilities and techniques through hard training, the real power of swords from this School could be manifested for the first time.

Illustration Techniques to attack from below in the Yakumarujigen School

Draw your sword as you approach your enemy.

Land the right foot as your sword is drawn all the way out of its sheath. The illustration shows the moment right before landing the right foot.

Use a rapid forward acceleration around the shoulder by a vertical rotation to slash upward.

Slash in the vertical plane.

Question 31

When you have your enemy at sword point and walk with a sliding motion, how can you maintain your balance yourself without swinging your arms?

When an ordinary person walks while assuming a posture with a sword in front, the sword sways (to the right with a right step) at each step and he loses his posture. However, experts in Kenjutsu and bare-hand martial artists walk while keeping their sword or the positions of both hands absolutely still. There must be a way to balance the angular momentum without swinging your arms. In fact, the torque of the force a landing foot gets from the ground mechanically balances the angular momentum. The following three are the relevant points in generating torque.

1. **Keep a space about 10 cm between both feet when walking.**
2. **Kick with the rear leg slightly inward as needed in the second half of landing.**
3. **Put the whole sole on the ground and use the torque of the rotation of the hip joint.**

Regarding point 1, Illustration 1 shows the change over time of the horizontal direction (front-back direction) of force the right foot gets from the ground while walking. The landing foot kicks the ground forward to put a brake on it in the first half of landing (the force the foot receives faces backward), and kicks the ground backward to reaccelerate in the second half. Illustration 2 shows this with the torque seen from above*1.

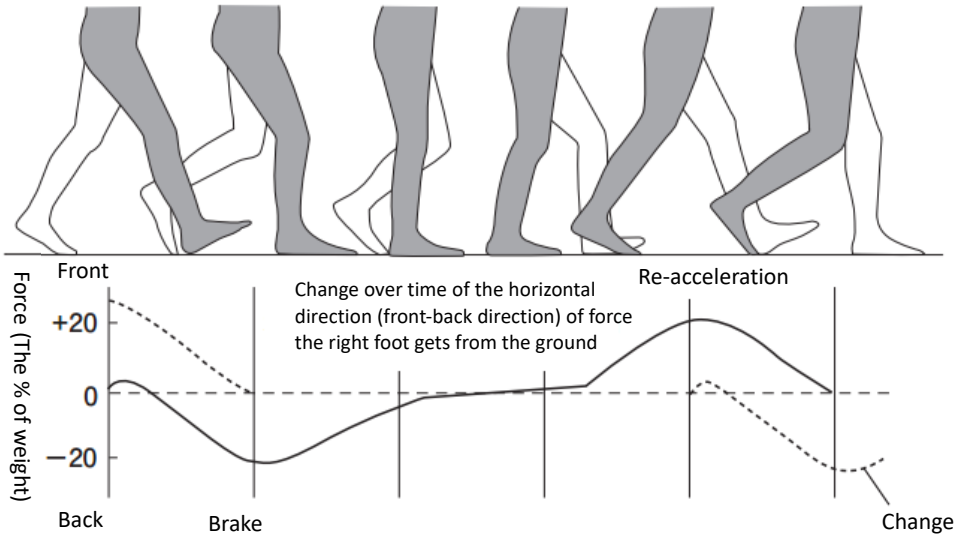
*1: The detailed relations between the angular momentum change and the torque is overly complicated, so we will pay attention only to the torque here.

Illustration 2a shows the first half of the landing of the right leg. As you kick the ground forward unconsciously*2, F_1, the force facing backward acts on the foot. This force is at the distance l sideways from the center of gravity (if you walk in a straight line, L=0), a clockwise torque $N_1=F_1 l$ is generated. Likewise, in the second half of landing (Illustration 2b), the torque is counterclockwise.

*2: Kicking consciously will bring about the reserve effect. Kicking is done so unconsciously that you don't even realize it.

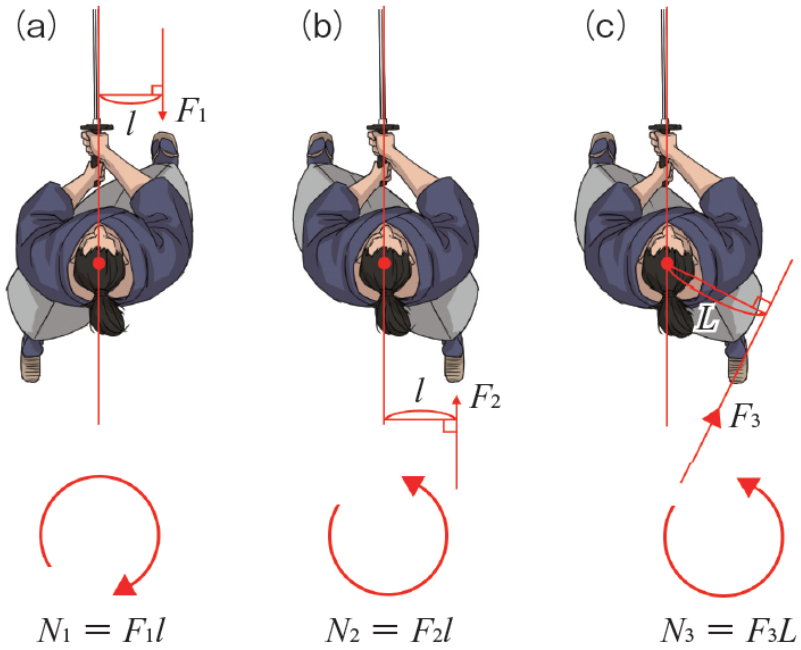
As for point 2, the kicking is done unconsciously as well. As in Illustration 2c, if the distance L from the center of the gravity is large, the torque is also large. Point 3 is also an unconscious motion: when the whole leg is twisted by the large muscle at the hip joint, a torque in the opposite direction to the twist is generated. (Illustration 3)

Illustration 1 Acceleration and deceleration when walking



Change over time of the horizontal direction (front-back direction) of force the left foot gets from the ground

Illustration 2 The torque of the force from the ground to the right foot

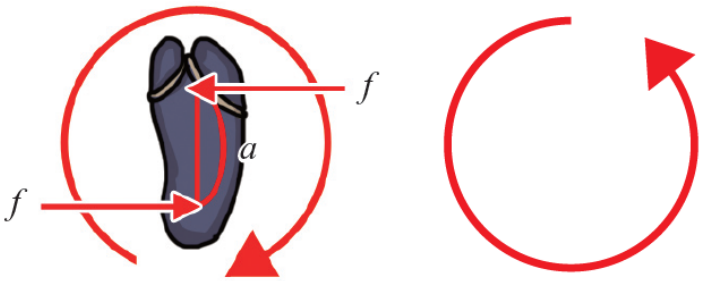


A) The torque in the first half of the landing is clockwise

B) The torque in the second half of landing is counterclockwise

C) A slight kick inward at the end of landing creates a large counterclockwise torque

Illustration 3 What is the twist for a landed leg?



Direction of twist (external rotation)

If a landed right foot is twisted externally (external rotation), force f works on the tips of toes and toenails, and a torque N_4 is generated. N_4 is not related to l in Illustration 2, but putting the whole sole on the ground is necessary.

Genre: Iai

Question 32
In Iai (the art of mental presence and immediate reaction), how can you draw a sword very swiftly?

Iai is a technique in which the movement of swiftly drawing a sword out of the sheath shifts into a slashing motion. This is a technique characteristic of Japanese Kenjutsu, utilizing the unique style of carrying a moderately curved sword in the sheath on the belt at the side. Like gunfighters in western movies, if you draw first, you win. Even if the enemy is prepared with his sword first, you can still compete with Iai. One of the advantages is that by drawing the sword, the length of your sword is not clear to the enemy.

The sword worn at the belt can slide back and forth (direction of the length), and the angle can be flexibly changed at the contact point of the belt and the sheath. The sword fits perfectly in the sheath and is covered with a metal fitting called Habaki at the root of the blade. As in Illustration 1, give a push to the handguard with the thumb of your left hand so that you can draw the sword easily, loosen the sword 1 cm to 2 cm out of the sheath. This is called Koiguchi wo kiru. When you do this, Habaki protects your thumb from getting hurt. In Iai, you take full advantage of the sword's structure. The following elements are indispensable in quick drawing of a sword, a characteristic of Iai.

1. **Movements you can do without being noticed**
2. **Supply the sword with enough energy to swing**

Drawing a sword is unexpectedly difficult.

To compare with the correct motions, let's look at an ordinary person's Iai (Illustration 2), which cannot be called a technique. The condition doesn't match points 1 or 2. He just stands upright, grips the handle, and tries to draw it. However, the sword is not loosened, and it takes him a while to start drawing (Illustration 2a). If the sword is a bit longer, your arm is not long enough to draw it (Illustration 2b).

Even if he manages to draw it, given the way he grips it, he is not ready for attack. He must either fix his grip or swing with a blade not kept straight. Not only is he slow in drawing, but his right wrist is clearly exposed due to the angle of the handle grip and he is open for attack. In an actual fight, his right wrist is cut while he tries to draw his sword. Further, the drawn sword has no momentum, so he cannot produce an effective attack with it.

The basis of an ordinary person's bad movement is that he stood upright and tried drawing the sword only with his right hand. Experts, on the contrary, make the relative positions of the sword and the sheath in an already drawn state, not by the right hand alone, but using the whole body. Of course, the movement of the right hand is important, but if you consciously try to draw with your right hand, you cannot perform a good Iai.

Draw using motions of the left waist and the right shoulder.

Next, let's look at a demonstration of drawing without using both hands (Illustration 3). Starting with the posture in Illustration 3a, moderately arch your back and bend your upper body (Illustration 3b). Without trying consciously, your left hand naturally slides the sword forward. As the upper body moves, your right hand also moves naturally as if getting the handle and grips from below.

Next, pull your left waist back and put your right shoulder ahead as you stretch out your curled back to throw out your chest. Now you can draw the sword more than halfway up as in Illustration 3c. The motions of both hands to the body are very slight, so the enemy is less likely to notice your drawing motion. What's more, as in Illustration 3c, the right elbow is fully bent with some slack, so it can lead to the next slashing motion.

When you actually draw it, the movements up to Illustration 3b are basically the same*. Imagine that your right shoulder and left waist are getting closer to each other, and your motion will get smoother. At this stage, the sword is moving forward with the starting momentum.

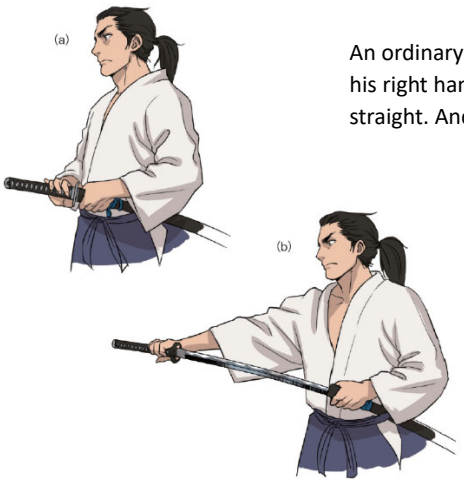
Next, as in Illustration 4, throw out your chest while trying to keep away your right shoulder and left waist which are coming closer. Extend the right elbow that had slack in Illustration 3c, bend the wrist (toward the pinky side), then cut the enemy vertically.

*Movements differ depending on schools or the direction of your swing, but either way use the whole body.

Illustration 1 How to loosen your sword (Koiguchi wo kiru)

Loosen the sword with the thumb of the left hand. The blade faces up, so hold the handle from below, and you can swing the sword immediately. The right elbow is kept down, so the right wrist is less likely to be cut.

Illustration 2 Drawing a sword is difficult.

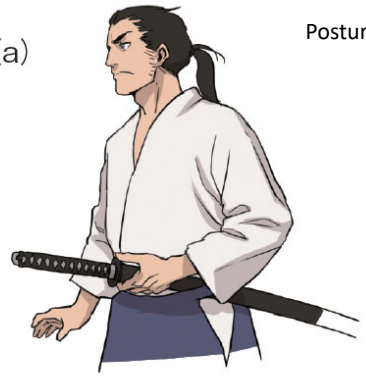


An ordinary person standing upright. He tries drawing the sword only with his right hand. He grips the handle sideways, so the blade cannot be kept straight. And the right elbow is raised, so his right wrist can be easily cut.

Fully extending the arm, but still not being able to draw the sword. Even if you manage to draw it, you cannot supply energy to the sword with a fully extended arm.

Illustration 3 How to draw a sword halfway without moving both hands

(a)



Posture

(b)

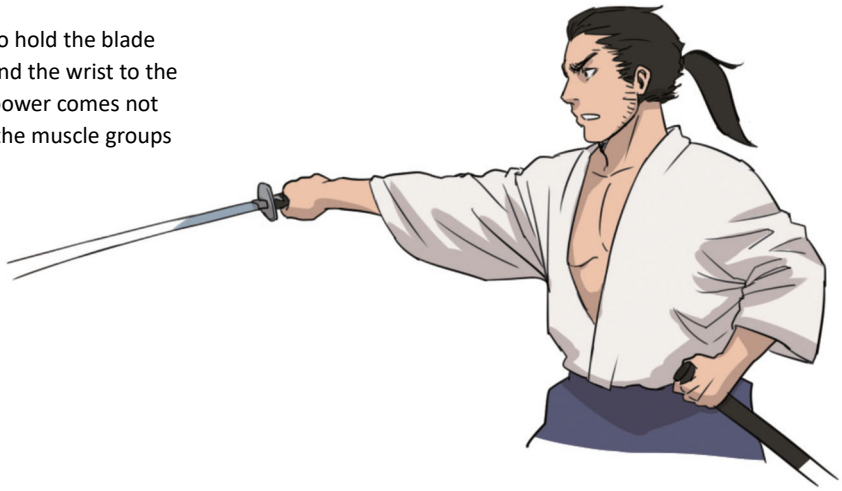
Bend the body as you arch your back, and the handle will get closer to the right hand.

(c)

Put the right shoulder ahead as you throw out your chest, pull back the left waist, then you can draw more than halfway up.

Illustration 4 How to cut upon drawing a sword

From Illustration 3b, rotate the sword to hold the blade horizontally, extend the right elbow, bend the wrist to the pinky side, and slash horizontally. The power comes not only from the right arm, but also from the muscle groups of the back and shoulders.



Question 33
Drawing a sword may be very swift in Iai, but what if the hilt is held down to keep the sword from being drawn?

This is a good question. Such situations are to be expected in Iai, so this is a basic technique. Indeed, if the ordinary person in Illustration 2 of the previous section has his right hand gripping the sword or the pommel held, he won't be able to draw it. However, the point is to observe the relative positions of the sword and the sheath. In a drawn state, you can make that happen using the movement of the whole body.

Illustration (a) shows the moment of drawing a sword in Iai, while the opponent (left) is holding the pommel to prevent it. It is impossible to thrust it aside and draw the sword with the right hand. If you forcibly try, you may create unguarded moments for the opponent to attack you. As in Illustration b, not opposing the force, without changing the position of the sword including the pommel, draw your sword with your left hand as you pull away your left waist, to have an already drawn state.

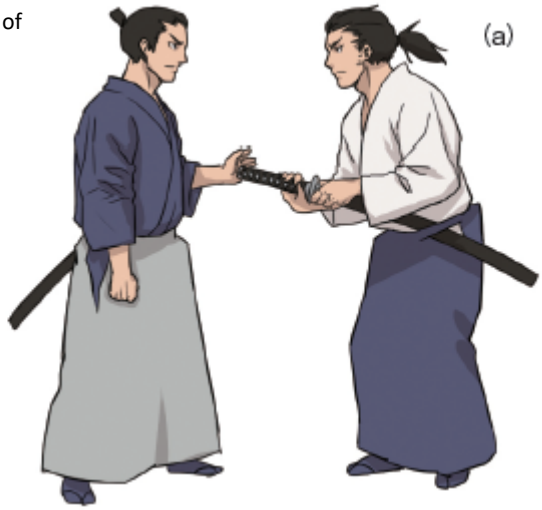
Even a slight motion to the pommel will be noticed by the opponent. According to the same principle as Q59, without changing the position of the pommel, the force pushing back the opponent's hand through the pommel, he will not perceive your motion.

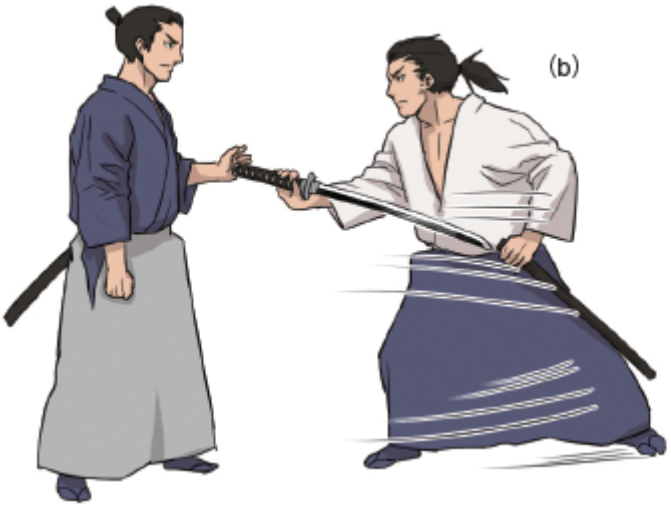
The sword you draw in this situation is still and has no energy. If the opponent is simply holding down the pommel, use your body weight and a twist of the wrist to rotate the blade downward with the pommel at the center of the rotation. Simultaneously, rotate the direction of the sword toward the opponent along the axis of its length. Put your left hand at the back of the blade and cut inside the thigh, etc., upward from below.

If your opponent is holding the handle with both hands, position the left hand earlier and wrest the handle using a large torque and cut him upward from below. If you use the technique more actively, hold the handguard to prevent your opponent to draw his sword, and use your whole body to draw your sword first and cut him.

Illustration How to draw your sword when your opponent holds the pommel

The opponent holds the pommel of your sword to prevent you from drawing it.





Without changing the position of the pommel or the force conveyed to the opponent, draw your sword as you pull away your left foot.

Change the direction of the sword and cut the opponent upward inside the thigh.