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Preliminary Taiji Stake Work and its suitability for use in physiotherapy

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***Abstract*—**Stake work is a basic skill of Taiji, and it provides Taiji practitioners a simple but highly effective way to improve their competency. At its most basic level, the purpose of stake work is to develop muscles and tendons to improve balance and the practitioners ability to do Taiji, and in the past, the original purpose of Taiji was for defense-offense: but in modern times it has evolved and practitioners now may practice Taiji as athletes for competitions, and as a method to aid fitness-health and self-cultivation. These Taiji routines are often a careful combination of postures, that are practiced and trained repeatedly until gradually they are mastered. Therefore, stake work (used in developing both strength and balance) must support three separate aims in Taiji. These being; classical competition and defense-offense; fitness-health and self-cultivation; and the third is the new development of Taiji routines for art performance[1], where the creation of art is combined with freestyle Taiji movements. The problem though is traditional stake work, is static, and it mainly improves the center of gravity. This means "Gravity Stakes" are only able to partially meet the needs of those who practice fitness-health, self-cultivation and Taiji routines or art performances, and it does not support those who are involved in competition and defense-offense. So, modifications have been made and we introduced the concepts of External Force Stake and Dynamic Stakes. Together these three stakes (Gravity, External Force stake, and Dynamic) were designed by the authors to create very simple exercises that fully support the three modern purposes of Taiji. It also, in part, illustrates that the "continuous transmission" in classic theory is the continuous transmission of internal force and strength (or momentum). This paper will discuss the muscles being strengthened and the possible application of these exercises for general use in physiotherapy. The paper will also focus primarily on External Force Stakes, and we will discuss Dynamic Stakes in a future article, which will be published next year.

External force stakes

When your body comes into contact with another practitioner, a mutual force is generated. The forces acting on both sides are equal in magnitude and opposite in direction. Thus the other party will have a force exerting on you. Standard stake training is designed with the aim to improve one's ability to withstand strong external forces. This is done through improving the strength of the body, and through improving the ability to transmit force, which relates to the ability to remain in balance in the face of these external forces. The problem is external forces can arise from many different directions, and can be divided into force and torque, but for simplicity, we can elect to consider that External Force Stakes are mainly concerned with horizontal forces, and Gravity Stakes have the function of

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providing a vertical force, or strength. Through combined practice, these Gravity and External Force Stakes are designed to improve one's ability to resist external forces in all directions.

When practicing external force stakes, the external force, the force of gravity and the reaction-force of the ground all act on the human body. Thus, the continuous transmission of force and the effect on the balance of the human body is not a trivial problem and only a brief overview can be provided here to covers the main points. For further details see reference 2.

Relaxation

Generally, a relaxed body is recommended when doing external force stake work. Relaxation is also linked to the shape of the body.

Qi sinks into Dantian. The head is stretched upward and the neck pushes up and back. Shoulders hang down and the elbows droop, with the wrist relaxed and the fingers extended. The chest is hollow and the back protrude, with the waist relaxed and the hip converge. The groin should be round and the knee bent, with the ankles lubricated and the toe gripping the floor.

These eight sentences apply to all external force stakes; but though we use the word relaxation, relaxation does not mean to completely relax all parts of the body, otherwise the result will be the person would need to lie down with no ability to withstand gravity or external forces. A more correct definition is relaxation of muscles and tendons is required to minimize the stress distribution on the human body when an impact is expected. Here, the primary aim is to perform martial art, and to minimize any stress and to distribute it across the body. If you have no purpose, then relaxation makes no sense. Relaxation is the optimization of resources to focus on the performance; and it uses the smallest possible effort, to achieve the maximum function or gain.

Continuous transmission

In Taiji there are 12 regular meridians and 8 extraordinary meridians. The twelve regular meridians are the three yin meridians for the hands and feet and the three yang meridians for the hands and feet, collectively called the twelve meridians. Within the literature their physiological function is mainly to circulate Qi-blood, connect the inside and outside, and the organs, and limbs, and also to maintain the integrity of human life. There are eight extraordinary meridians, named Ren, Du, Their main function is to regulate Qi-blood. The meridian system of the human body is shown in Fig. 1. The human body's bone and joint systems are shown in Fig. 2; and the human muscle system is shown in Fig. 3.

The details surrounding the concepts of Qi have been published previously[3]; but in this paper the emphasis is more in line with physiotherapy, and the improvement in muscle and balance, which links to brain health and general wellness.

At its simplest level the muscles are the driving force behind all human movement. Muscles are attached to bones or internal organs and have the ability to stretch and contract. Tendons connect bones to muscles, and the ligaments connect bones to bones to strengthen joint stability. These muscles stretch and contract to transmits power to the skeleton through tendons to form a dynamic frame. The phrase Myofascial refers to the relationship between the muscles and the fascia, the connective tissue that surrounds and supports them.

The continuous transmission of the dynamic frame transmits two mechanical quantities. These are force and momentum. In Taiji we can in general say that "Force" is the interaction between objects, and "Internal Force" is the interaction between body parts. The force in continuous transmission is the transmission of internal force.

The transmission of internal force can change in both quantity and direction, and

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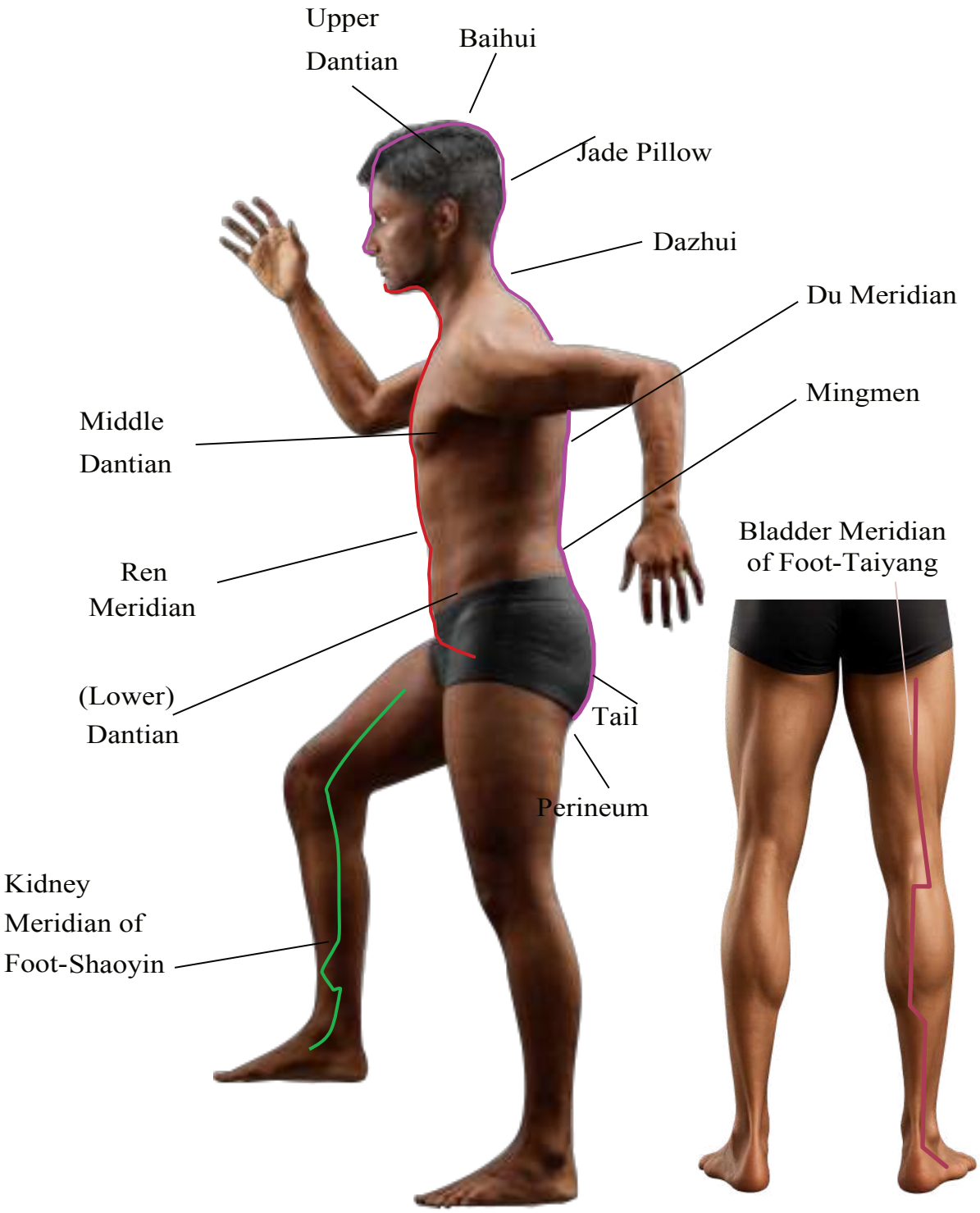

Fig. 1 Human accupoints and meridians[5].

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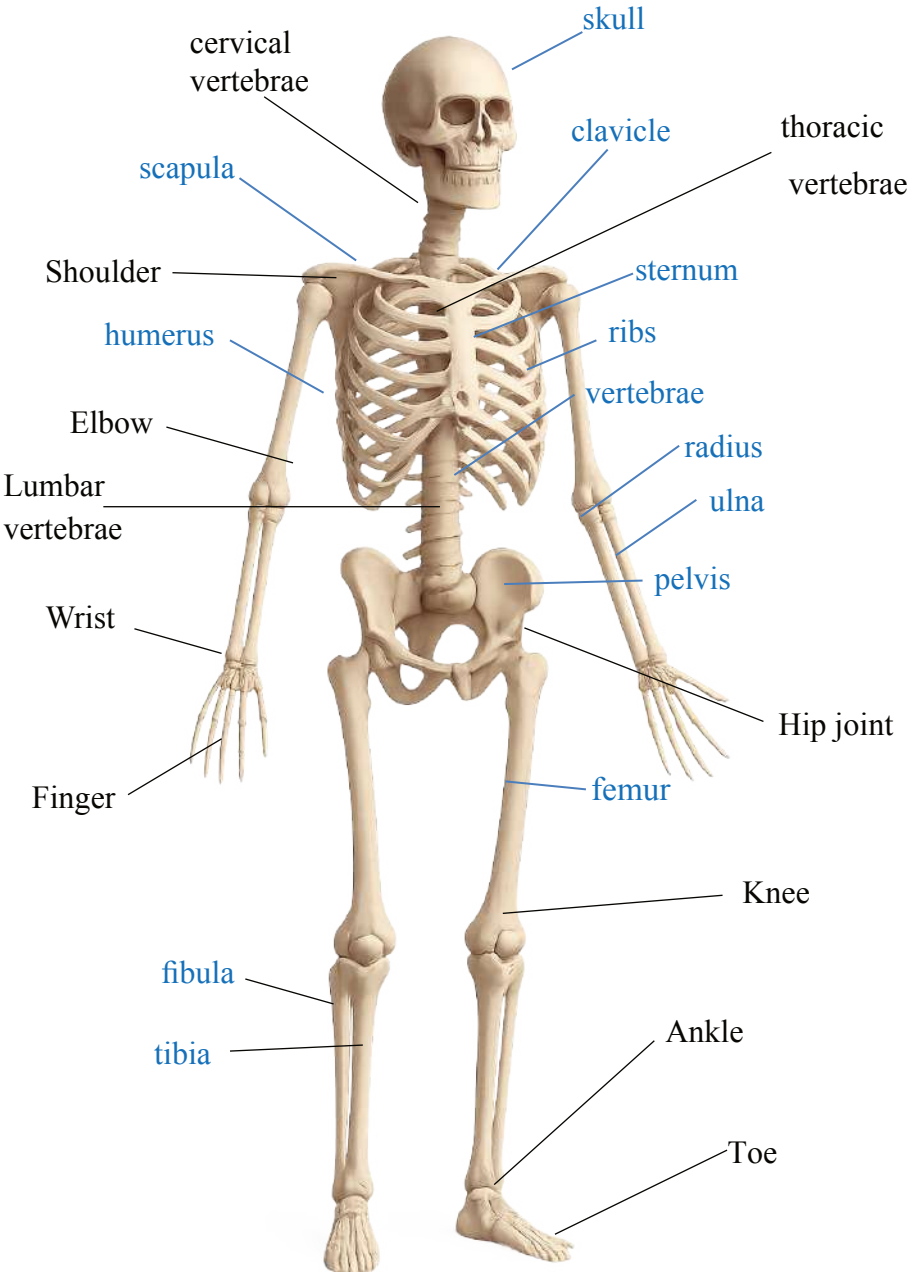

Fig. 2. Human bones and joints

Fig. 2. The Bones and Joints of the human body.

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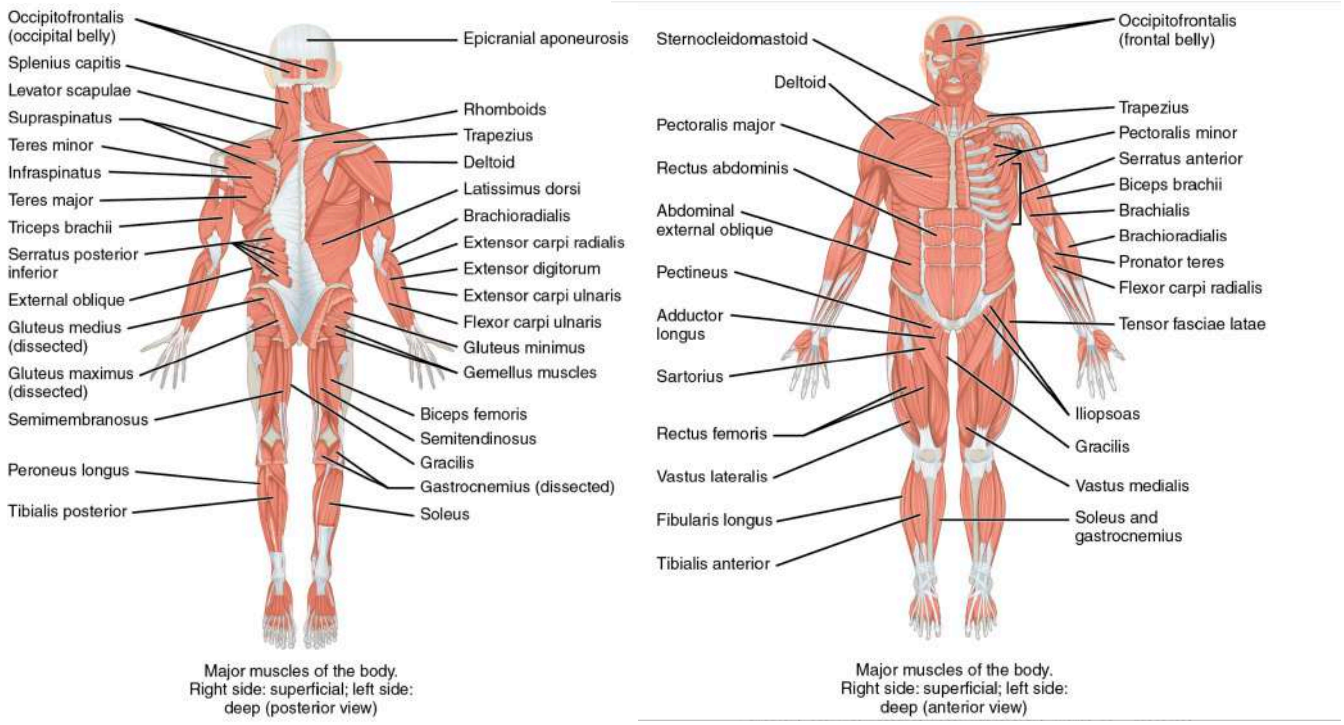

Fig. 3. The Human Muscle System. Image courtesy of Anatomy and Physiology by OpenStax Attribution 4.0 International (CC BY 4.0).

the effectiveness of this is dependent on the level of the practitioner. Though we do not think about this, linear momentum is the product of mass and velocity, and angular momentum is the product of rotational inertia and angular velocity, and often the aim is to rapidly transition between them.

Thus it is important for a practitioner to understand and know how to retain balance, in order that any rapid movements will not cause any issues in maintaining the optimum stable posture. It is also necessary to instinctively react to any changes in momentum, which is a complex combination of linear momentum and angular momentum and their affects on the muscles, myofascial, tendons, ligaments, bones, and internal organs. Often this is done without thinking, but clearly all will have their own mass, angular velocities, moment of inertias and linear velocities, and to model these computationally is very complex.

It should also be noticed that the momentum experienced by different practitioners, who practice Taiji for different purposes, will also differ, with the most extreme forces being generated in competitions. However, until now, medical, physiotherapy and scientific studies in this area are, surprisingly, still very limited, and in some cases there are no prior medical studies.

So, the aim of this study is to introduce the general concepts behind 8 simple exercises, with these exercises being carefully designed to generate rapid, noticeable benefits for both the beginner-level and the experienced practitioner, who expect to experience External Forces. It is also the aim of this paper to identify areas where further research might be beneficial. As previously noted, these eight general exercises involve advanced stakes for External Force Stakes. We will look at Dynamic Stakes in a future article.

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The Horse Moving Center Stake

The aim of the Horse Moving Center Stake is to improve balance and strengthen the deltoids, biceps, forearm, triceps, legs, core, quadriceps and the muscles around the knee.

The Horse Moving Center Stake is shown in Fig 4 and Fig 5. In practice, the practitioner should hold dumbbells or other suitable weights in both hands. To begin, Inhale when the dumbbells are in the down position and exhale as they move forward. Then inhale again as the dumbbells move down and exhale as they move backward. In Taiji the mind guides the gravity center so that it is located in the center of the area of the soles at every moment.

It is best if the weight of the dumbbells is customized and they should not over-exert the practitioner's body. Unlike in Physiotherapy, where the exercise is designed with the aim to strengthen just one specific muscle, or the tendons, or perhaps to assist the movement of the nerves, in Taiji exercise breath control is considered to be very important, as it assists in balance and controlling the practitioners energy. It is advised that one unit of exercise should take 8 deep breaths as a single exercise cycle. However, fewer units will still generate some benefit and the exercise can be tailored, where the intent is to help recover physical strength and stability.

When moving forward in the horse stake, due to the forward movement of the dumbbells, the comprehensive gravity center of the dumbbells and the human body will move forwards. At this time, the practitioner must use their mind to guide the muscles of the legs to move the comprehensive gravity center back to the center of the soles.

This makes this exercise useful for general brain health, for controlling stress, as well as exercising various muscles, and tendons. When moving backward in the horse stake, due to the backward movement of the dumbbells, the combined center of gravity of the dumbbells and the body moves backward. This forces the practitioner to practice returning the body to the gravity center, but it is important to note that the direction of movement of the arms and legs can affect the muscles and tendons differently, with slow downwards motions and slow upward motions often activating different muscles and tendons.

Fig. 4. Horse stake motion forwards.

Fig. 4. Horse stake motion backwards.

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Left and Right hand big horse lateral force stake

Fig. 6. & 7 Large horse stance left hand lateral force stake, front and side views.

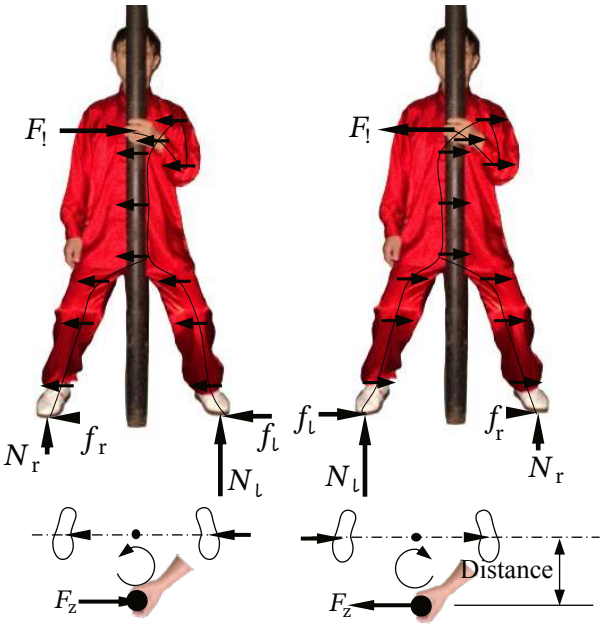

Fig. 8. & Fig. 9. Large horse stance left hand lateral push and pull.

The left hand big horse lateral force stake, viewed from the front and side, are shown in Fig. 6 and 7. Here, the purpose of this exercise is to help strengthen the deltoids, pecs, core, obliques, and through squatting the exercise also works the outer hips, the inner thigh, and the leg, knee and ankle muscles. In this exercise the practitioner stands behind a pillar, and alternatively uses his left hand to push and pull against the pillar, with upper level practitioners increasing the force to the point one of the feet will lift slightly from the ground.

The feet are about three feet wide apart, and the toes are roughly forward and naturally out-turned. The line connecting the two feet is perpendicular to the forward direction. Two legs squat, with the height determined by the capability of the practitioner, or in the case of a patient by the recommendation of the physiotherapist.

The hip joint, knee, heel and toe are in the same plane. The left arm stretches forward, the shoulder hang down and the elbow droops, with the left hand holding the pillar, and the right arm hangs naturally on the right side. The center of gravity is at the center of the two feet, and on the line connecting the two feet. The main tone of the upper body is neutral and comfortable, and the practitioner can tilt forward naturally. The head is held upright, with the eyes looking straight ahead.

As in the Horse Moving Center Stake**, t**he mind guides the center of gravity so that it is located in the center of the supporting area, which is perpendicular to the line connecting the two feet. In this exercise breathing and the left-hand delivering the lateral force are coordinated, see Fig. 8 and Fig. 9. In the first breath the left hand delivers a pushing force, see Fig. 8. Specifically, the left palm pushes the pillar horizontally to the right, and the pillar has a horizontal reaction force on the left palm (as shown by the thick arrow of horizontal force in Fig. 8) that acts horizontally to the left. At upper skill levels the horizontal force is mainly borne by the

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frictional forces and of the left and right feet, horizontally to the right. Next, reduce the push force to zero when inhaling. Then increase the push force when exhaling, to the desired level. As in all cases, the center of gravity still acts on the human body, see the thick arrow in Fig. 7. The normal forces act upwards on the left and right feet, see Fig. 8. External forces are indicated by thick arrows.

When the practitioner's push force reaches zero, the stance is a large horse gravity stake, with each foot bearing half the weight. As the push force increases, the load on the left foot increases, until it bears the full weight.

Due to the distance between the gravity center and the pillar, there is a moment acting on the human body when pushing, and the right foot will not fully leave the ground. In this exercise, a practitioner can change the practice methods according to their own abilities and needs.

For example, they can use a fixed pushing force to experience the continuous transmission of internal force; or they can change the size of the pushing force to establish their own capability.

For self-cultivation, you can control the size of the pushing force, you don't need to push the body to the absolute limit, nor do you have to push your right foot into the air. The most important point to note is during inhalation reduce the pushing force, and during exhalation increase the pushing force, and one breath controls the horizontal pushing force for one cycle. Then, in the second breath, the left hand now delivers a pulling force force, see Fig. 9. The left hand pulls the pillar horizontally to the left, and the pillar (through equal and opposite forces) has a horizontal reaction force on the left hand, as shown by the thick arrow of horizontal force in Fig. 9, which acts horizontally to the right. Again, at the highest levels of training, the horizontal force is borne by the frictional forces on the left and right feet, act horizontally. Once more reduce the pull to zero when inhaling, and increase the pulling force when exhaling, until, ideally, all the weight is borne by the right foot. As before, as the force increase the right foot will finally become slightly airborne, and the cycle can then repeat. It should be noted that bystanders watching this exercise may not see that the practitioner is actually moving, but despite this, the practitioner is practicing a dynamic process, and the process is improving their strength in a wide variety of muscles. The thin lines in Fig. 8 and Fig. 9 represent continuous transmission of the internal force. This is the internal force that provides the horizontal pushing and pulling forces which rely on the a large variety of muscles, which are superimposed on the internal force. When the pushing and pulling forces change in magnitude, these internal forces will change accordingly; and if there is a problem with any link in the sequence, the force cannot be smoothy transmitted or, to express it more accurately, a continuous transmission cannot be achieved.

The right hand big horse lateral force stake is shown in Fig. 10, and the side view is shown in Fig. 11. Fig. 12 shows the situation where the right hand delivers a pushing force and the continuous transmission of internal force during breathing. Then in Fig. 13 the direction is reversed, and the image shows the right hand delivering a pulling force. As with the left hand, breath control is important. The right hand big horse lateral force stake and the left hand big horse lateral force stake are symmetrical, thus a detailed discussion is omitted.

In Fig. 12 and Fig. 13, the muscles of the two legs, the muscles of the torso, and the muscles of the right arm on the continuous transmission path running from the two feet to the right hand are all actively operating in the stake work and are thus exercised.

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Fig. 10. Large horse stance right hand lateral force stake.

Fig. 11. Large horse stance right hand lateral force stake side view.

Fig. 12. Large horse stance right hand lateral push.

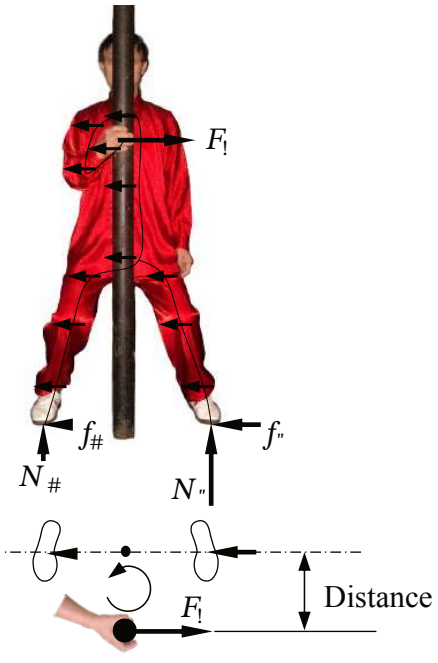

Fig. 13. Large horse stance right hand lateral pull.

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Left and Right Hand Big Horse Torque Stake

The left hand big horse torque stake are shown in Fig. 14 and Fig. 16, and the side view is shown in Fig. 15. The pillar is positioned in front and slightly to the left. The feet are about three feet wide apart, and the toes are roughly forward and naturally out turned. The line connecting the two feet is perpendicular to the forward direction, and the legs squat down, where the height is determined by the capability of the person doing the exercise. The hip joint, knee, heel and toe are in the same plane. The left arm stretches forward, the shoulder hang down and elbow droop, and the left hand is holding the pillar. The right arm hangs naturally on the right side. The center of gravity in at the center between the two feet and on the line connecting the two feet. The main tone of the upper body is neutral and comfortable, and you can tilt forward naturally. The head is held upright. The eyes look straight ahead, and the mind guides the gravity center to be located in the center of the supporting area that is perpendicular to the line connecting the two feet. The purpose of this exercise is primarily to strengthen the supinators located in the posterior forearm, and pronators. However, as the exercise also employs a squat, it also strengthens the hip extensor muscles, the quadriceps femoris, the hamstring muscles, and the practitioner's core muscles. In the first breath-sequence the left hand delivers an outwards turn-rotation torque, see Fig. 14. The left hand twists the pillar outward in the x direction, and the pillar then generates a counterclockwise torque to the left hand (see Fig. 14).

When inhaling, reduce the torque to zero, then increase the torque when exhaling. In each case generate torque to the appropriate amount that is required.

In Fig. 14, and 15 the external forces are indicated by thick arrows. In this exercise, when no torque is applied, the stance is a big horse gravity stake, with each foot bearing half the weight. As the torque is increased, and if the practitioner is able to keep the body rigid, a difference in the normal forces between the two feet may occur. It should be noted that since the torque, for most practitioners, is usually not large, and the left foot will remain grounded for most patients and practitioners. In the second breath-sequence the direction of the left hand changes and now delivers an in-turn rotational torque, see Fig. 16. The left hand twists the pillar inward in the x direction, and the pillar has exert a clockwise torque to the left hand, as shown in Fig. 16. For this exercise the torque is reduced to zero when inhaling, and the torque is increased when exhaling, with the maximum torque defined by comfort level and the ability of the person. As before, the exercise employs a horse stance and gravity still acts on the human body, see Fig. 16, and when the torque is zero, the stance is a big horse gravity stake, with each foot bearing half the weight. As in the first cycle, unless the practitioners muscles are especially strong the right foot will not leave the ground. It can be seen from Fig. 14 and Fig. 16 that the difference in the normal forces of the soles are transmitted to the left hand through the internal force, and then acts on the pillar. If there is a problem with any link in the sequence, the force cannot be transmitted, and the continuous transmission cannot be achieved. In Fig. 14 and Fig. 16, the muscles of the two legs, the muscles of the torso, and the muscles of the left arm on the continuous transmission path running from the two feet to the left hand are actively operating in the stake work and are thus exercised. The right hand big horse torque stake is shown in Fig. 17 and Fig. 19, and the side view is shown in Fig. 18.

As the right and left hand big horse torque stakee are symmetrical, a detailed discussion is omitted.

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Left Hand Big Horse Torque Stake

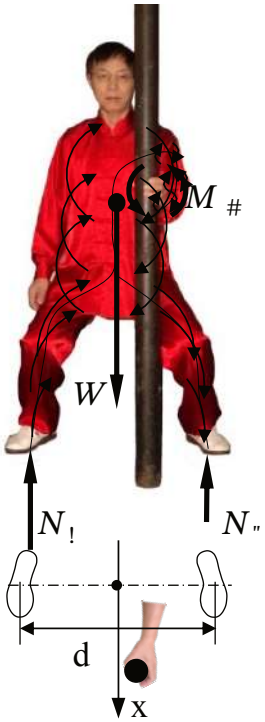

Fig. 14. Left hand outward torque

Fig. 15. Left hand outward torque (side view)

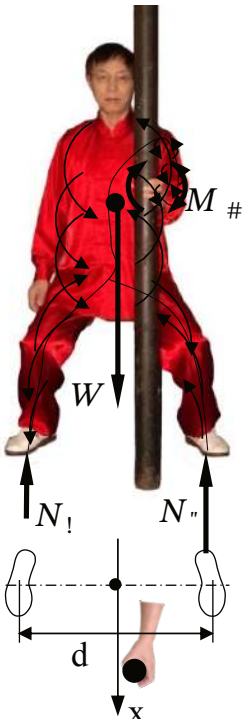

Fig. 16. Left hand inward torque

Right Hand Big Horse Torque Stake

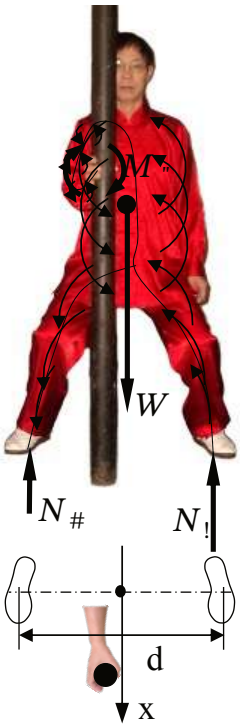

Fig. 17. Right hand outward torque

Fig. 18. Right hand outward torque (side view)

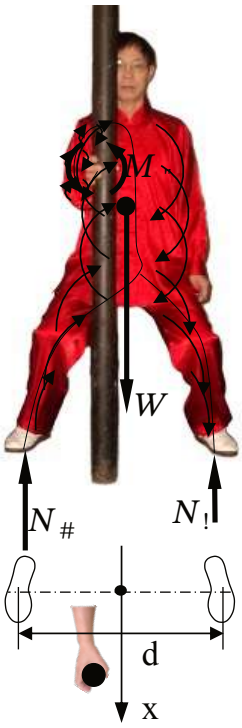

Fig. 19. Right hand inward torque

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Left and Right Along Bow Push Stake

The left along bow push stake is shown in Fig. 20. The left foot is in front, toes pointing forwards. The left leg is bowed, and the tip of the left knee is almost vertically above the Yongquan acupuncture point. The right foot is to the rear, with the toes turned out to about 60 degrees. In this exercise the right leg extends and the knee is bent slightly. The distance between the front and rear of the two feet can be customized. The line connecting the rear foot and the front foot points forward. The front-to-rear distance determines the height of the stake.

In this exercise the practitioner is mainly working the deltoid muscles, but the pose will also work the core paraspinal muscles, the hip extensors, and again the knee and ankle muscles. The aim is to extend your left arm forward. While doing this it is important to sink the shoulders and drop the elbows, and stand with your left palm facing forwards and then press towards the pillar. The force should originate from the waist to the shoulder to the arms to the wrist. The right arm hangs naturally, on the right side.

The center of gravity is close to the front foot on the line connecting the two feet, and the weight of the two feet is distributed according to the distance from the center of gravity, from the front and rear feet. The main tone of the upper body is neutral and comfortable, and you can lean forward naturally. The head is held upright, with the eyes looking straight ahead. The mind should concentrate on guiding the center of gravity so that it is located at the center of the supporting area that is perpendicular to the line connecting the two feet. It is also important that the front and rear feet, the center of gravity, the contact point of the left palm and the pillar are all in a vertical plane. The left palm pushes the pillar horizontally, and the pillar has a horizontal reaction force on the left palm, see Fig. 21. The horizontal force is borne by the frictional forces and by

Fig. 20. Left along push stake

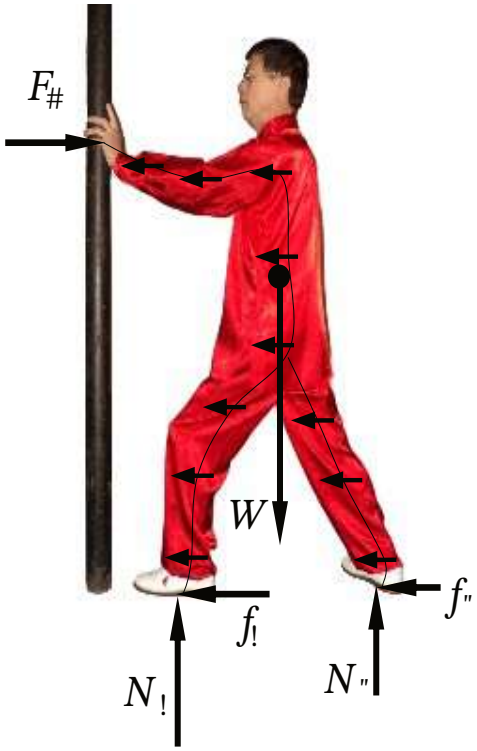

Fig. 21. The internal and external forces generated.

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Fig. 22. The internal and external forces generated in the Right Along Bow Push Stake

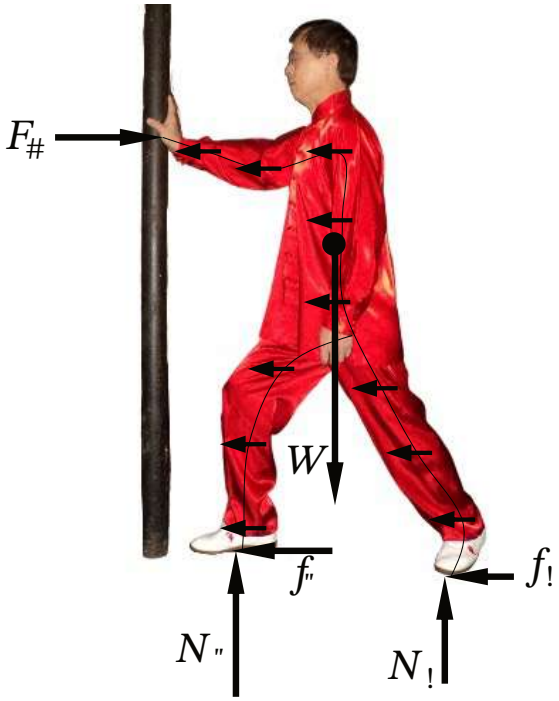

Fig. 23. The internal and external forces generated.

the front and rear feet. In this exercise, reduce the push force to zero when inhaling, and increase the push force when exhale. The amount of force exerted is again dependent on the capability of the person. When the push force is zero this is a bow gravity stake, and the load-bearing capacity of the front foot is greater than that of the rear foot.

As the pushing force increases, the load-bearing capacity of the front foot will decrease until it reaches zero. When the pushing force continues to increase, the weight is fully borne by the rear foot. In some cases, when the pushing force exceeds frictional forces, the rear foot can slip, and the benefits of this exercise will diminish. For physiotherapy, a fixed pushing force may also be employed, and the magnitude of the pushing force can be modified to account for the needs of the patient. For self-cultivation, the amount of the pushing force can be modified, and it is not required to push the body to its limits, nor to always force the foot front foot into the air. During inhale reduce the pushing force, and while exhaling increase the pushing force. Again, though bystanders might not see that the practitioner is moving, the practitioner is practicing a dynamic process. It is recommended to take 8 deep breaths as a unit, with the number of units is dependent on the needs and the ability of the person.

In Fig. 21, the muscles of the two legs, the muscles of the torso, and the muscles of the left arm on the continuous transmission path running from the two feet to the left hand are actively operating in the stake work and are thus exercised. The right along bow push stake is shown in Fig. 22 and Fig. 23. The right along bow push stake and the left along bow push stake are symmetrical, and a detailed discussion is omitted. In Fig. 23, the muscles of the two legs, the muscles of the torso, and the muscles of the right arm on the continuous transmission path running from the two feet to the right hand are actively operating in the stake work and are thus exercised.

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Left and Right Opposite Bow Push Stake

The left bow opposite bow push stake is shown in Fig. 24. As with the prior exercises the pillar is placed in front of the practitioner. The left foot is in front, with the toes facing forwards. The left leg is bowed, and the tip of the knee is almost vertically above the Yongquan acupuncture point. The right foot is placed at the rear, and turn toe the out to about 28 degrees. The right leg extends and the knee bend slightly. The distance between the front and rear of the two feet can be customized to the person who is doing the exercise, and the front-to-rear distance determines the height of the stake. The two feet are placed laterally one fist width apart.

Extend your right arm forward, sink your shoulders and drop your elbows, and press your right palm on the pillar forward. The rear foot, right palm and pillar are all in a vertical plane. The left arm hangs naturally on the left side. The gravity center in the front and rear directions is closer to the front foot, and the weight of the two feet is distributed according to the distance from the gravity center to the front and rear feet. The main tone of the upper body is neutral and should be comfortable, so that you can lean forward naturally. The head is held upright, and the eyes look straight ahead.

In this exercise as the opposite arms and legs are placed forwards different trunk muscles will be activated, but in most regards the muscles being activated are similar to the prior discussed along-push stakes. Here the intent is to guide the gravity center to change between the line of the two feet and the vertical plane of the rear foot and palm and pillar. When the gravity center is placed on the line of the two feet, the stance is good for balance. When the gravity center is on the vertical plane of the rear foot and palm and pillar, it is beneficial for delivering force. The horizontal force see Fig. 25 is mainly borne by the frictional forces experienced by the front and rear feet.

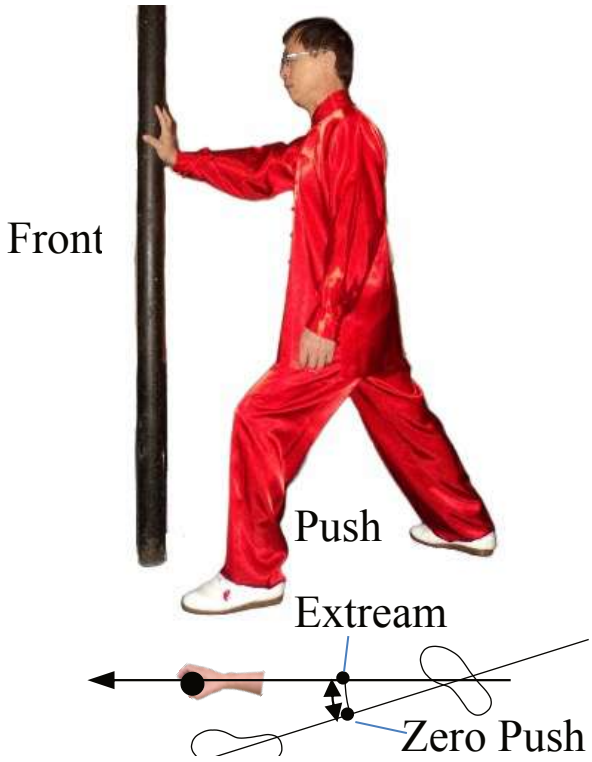

Fig. 24. Left opposite bow push stake.

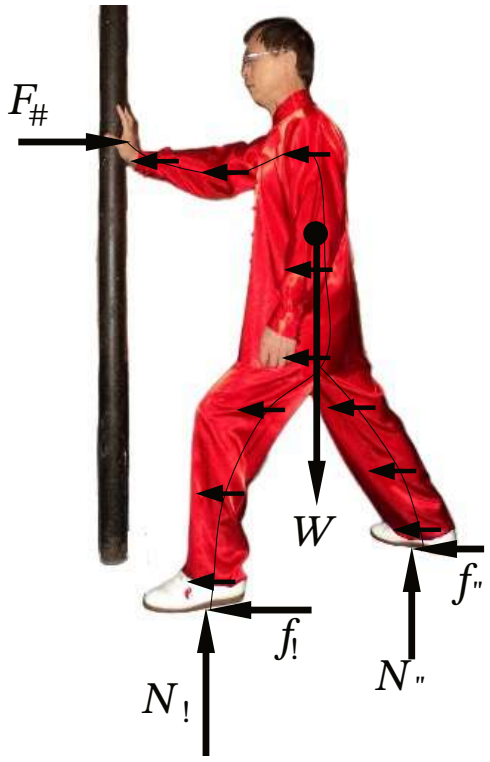

Fig. 25. The internal and external forces generated.

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Fig. 26. Right opposite bow push stake.

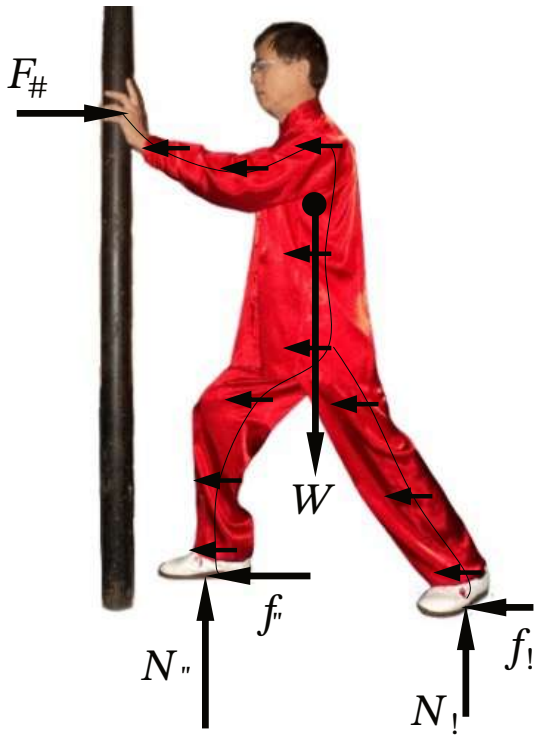

Fig. 27. The internal and external forces generated.

When inhaling, reduce the pushing force to zero, and use your mind to guide the center of gravity to the line between the two feet to facilitate balance. When exhaling, increase the pushing force as much as one is able, and guide the gravity center to move to the vertical plane of the rear foot and palm and pillar to balance the mechanical conditions to maximize the pushing force delivery.

When the pushing force is zero, this is a bow gravity stake, and the load-bearing capacity of the front foot is greater than that of the rear foot. As the pushing force continues to increase, the gravity center shifts to the vertical plane of the rear foot and palm and pillar when the load-bearing capacity of the front foot is zero. When the pushing force continues to increase, the weight is fully borne by the rear foot until the practitioners pushing force reaches either the desired goal, or the limit of their strength. Typically 8 breaths is one exercise unit, with the number of units dependent on the needs of the patient or the practitioner. Again, though it may appear that the practitioner's center of gravity is not moving, the practitioner is practicing a dynamic process.

In Fig. 25, the muscles of the legs, the muscles of the torso, and the muscles of the right arm on the continuous transmission path running from the two feet to the right hand are all actively operating in this stake and are thus exercised.

The right-side of the exercise is shown in Fig. 26 and Fig. 27, and the instructions mirror those for the Left Opposite Bow Push In Fig. 27, the muscles of the two legs, the muscles of the torso, and the muscles of the left arm on the continuous transmission path running from the two feet to the left hand are all actively operating in this stake work and are thus being exercised.

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Right and Left Along Sit Pull Stake

The right along sit pull stake is shown in Fig. 28. The pillar is in front, and the left foot is moved forwards with the toes pointing to the front. The left knee is slightly bent. The right foot is positioned to the rear, and turn the toes out 45 degrees.

Sit on the right leg. As with all exercises, the distance between the front and rear of the two feet can be customized, and the front-to-rear distance determines the height of the stake. The feet are placed laterally one fist width apart. Extend your left arm forward, sink your shoulders and drop your elbows, hold the ring with your left hand and attempt to pull the pillar backwards. The front foot, left hand and pillar are in a vertical plane. The right arm hangs naturally on the right side. The gravity center in the front and rear directions is closer to the rear foot, and the weight of the two feet is distributed according to the distance from the gravity center to the front and rear feet. The main tone of the upper body is neutral and comfortable, and you can lean forward or backward naturally. The head is held upright. The eyes look ahead. In the normal direction of the line generated by the two feet, guide the gravity center to change between the line of the two feet and the vertical plane of the front foot and hand and pillar. When the gravity center is on the line of the two feet, it is good for balance. When the gravity center is on the vertical plane of the front foot and hand and pillar, it is beneficial for delivering force. The primary aim of this exercise is to strengthen the latissimus dorsi muscles, the middle trapezius muscles, the deltoids, but as a squat is employed this exercise will also activate the core, leg and knee muscles. When inhaling, reduce the pulling force to zero, and the mind guides the gravity center to move to the line of the two feet to facilitate balance. When exhaling, increase the pulling force and attempt to guide the center of gravity center to the location where the vertical plane of the front foot and hand and pillar.

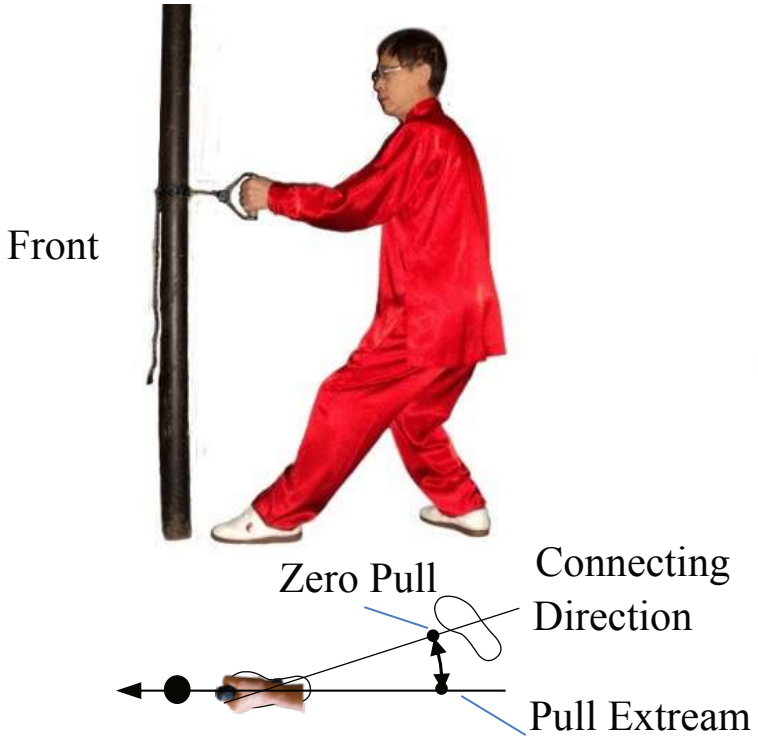

Fig. 28. Right along sit pull stake.

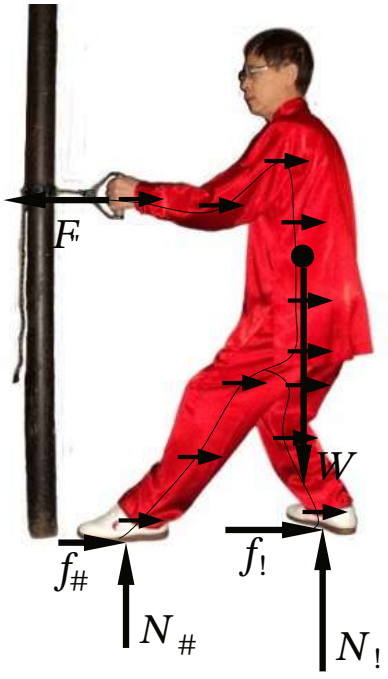

Fig. 29. The internal and external forces generated.

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Fig. 30. Left along sit pull stake.

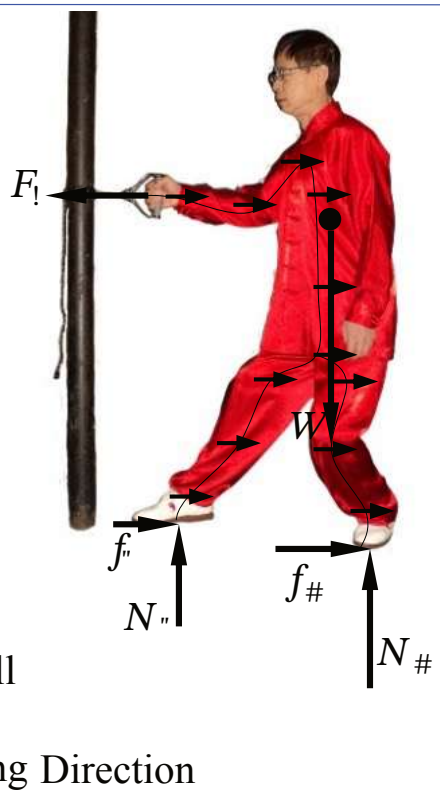

Fig. 31. The internal and external forces generated.

When the pulling force is zero, this is a virtual gravity stake, and the load-bearing capacity of the front foot is less than that of the rear foot. When the pulling force increases continuously, the gravity center shifts to the vertical plane of the front foot and hand and pillar when the load-bearing capacity of the rear foot is zero. As the pulling force continues to increase, the weight is fully borne by the front foot. It is also possible to use a fixed pulling force and the magnitude of the pulling force can be modified to the capability of the person, and there is no need to pull the rear foot into the air. When inhaling, reduce the pulling force; 8 deep breaths is considered to be a single unit, and the number of units can again be modified to the needs of the person. In Fig. 29, the muscles of the two legs, the muscles of the torso, and the muscles of the left arm on the continuous transmission path running from the two feet to the left hand are actively operating in the stake work and are thus exercised. The left along sit pull stake is shown in Fig. 30 and Fig. 31, and the instructions mirror the right along sit pull stake. In Fig. 31, the muscles of the two legs, the muscles of the torso, and the muscles of the right arm on the continuous transmission path running from the two feet to the right hand are actively operating in the stake work and are thus being exercised.

Right and Left Opposite Sit Pull Stake

In this exercise the opposite arm and leg are placed forwards. Thus there is a slight difference in balance, and the exercise will help strengthen the hip adductors. The Right opposite sit pull stake is shown in Fig. 32. The pillar is again in front, with the left foot placed forwards and the toes pointing to the front. The left leg is extended with the knee slightly bent. The right foot is to the rear, with the toes turned out by about 60 degrees. If possible the aim is bend the knee to sit on the right leg. The distance between the front and rear of the two feet can be customized. The line connecting the rear foot and the

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Fig. 32. Right opposite sit pull stake.

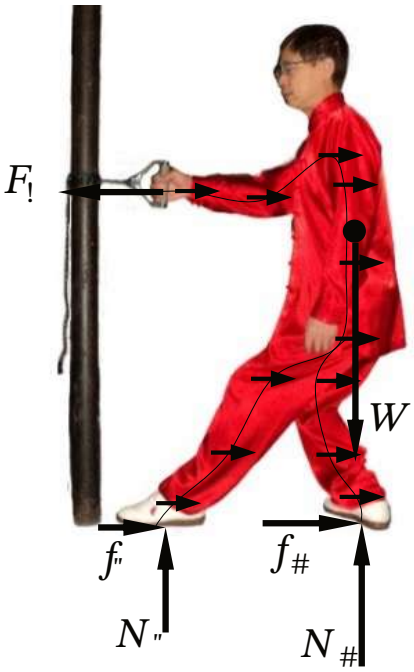

Fig. 33. The internal and external forces generated.

front foot points forward, and the front-to-rear distance will determines the height of the stake. Extend your right arm forwards, sink your shoulders and drop your elbows. As you hold the ring, attempt to pull the column backwards. The left arm hangs naturally on the left side. The gravity center is close to the rear foot, and the weight of the two feet is distributed according to the distance from the gravity center to the front and rear feet. The main tone of the upper body is neutral and comfortable, so that you can naturally lean forwards or backwards. The head is held upright, with the eyes looking straight ahead.The aim is to guide the center of gravity to the center of the supporting area that is perpendicular to the line connecting the two feet.

The front and rear feet, the center of gravity, and the contacting point of the right hand and the pillar should all be in a vertical plane. The right hand attempts to pull the pillar horizontally. When inhaling, reduce the pulling force, evenly to zero. When exhaling, increase the pulling force to the desired level. When the pulling force is zero, this is a virtual gravity stake, and the load-bearing capacity of the front foot is less than that of the rear foot. As the pulling force continues to increase, the load-bearing capacity of the rear foot continues to decrease until it reaches zero.

The magnitude of the pulling force can be changed to the person's capability, and the continuous transmission of internal force can also be used. As before, when possible, employ 8 breath cycles to create a single unit, and the number of units are then varied. In Fig. 33, the muscles of the two legs, the muscles of the torso, and the muscles in the right arm (on the continuous transmission path running from the two feet to the right hand) are actively operating in the stake work and are being exercised. The left opposite sit pull stake is shown in Fig. 34 and 35. The left opposite sit pull stake and the right opposite sit pull stake are symmetrical, and further discussion is not necessary.

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Fig. 34. Left opposite sit pull stake.

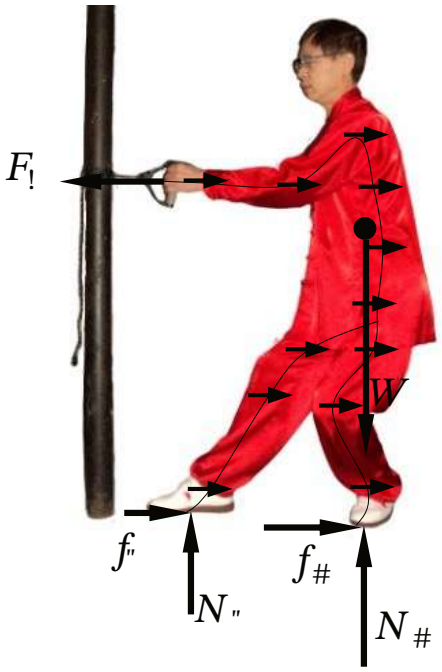

Fig. 35. The internal and external forces generated.

Left and Right Bow Lateral Stake

The left bow lateraling stake is shown in Fig. 36. The pillar is placed in front, but closer to the body that in the previous exercises. The left foot is placed forwards with the toes pointing to the front. The left leg bow, and the tip of the knee is almost vertically above the Yongquan acupuncture point.

The right foot is placed to the rear, with the knee extending outwards and is slightly bent. The toe is turned out to about 45 degrees. The distance between the front and rear of the two feet can be customized. The two feet are placed laterally about one shoulder width apart, and the front-to-rear distance determines the height of the stake. Extend your left arm forward, sink your shoulders and drop your elbows, and left arm horizontally and laterally push the arm towards the pillar. The right arm hangs naturally on the right side. The center of gravity is close to the front foot, and the weight of the two feet is distributed according to the distance from the center of gravity to the front and rear feet. The main tone of the upper body should be neutral and comfortable, and you can naturally lean forwards. The head is held upright, and the eyes look straight ahead. The intent is to guide your center of gravity so that it is located at the center of the supporting area that is perpendicular to the line connecting the two feet. The front and rear feet, the center of gravity, and the contacting point of the left hand and the pillar are all in a vertical plane.

Here, the primary purpose of this exercise it to strengthen the deltoids, the practitioners back muscles, the trunk muscles surrounding the abdomen and the the core muscles which provide stability and support for the spine and pelvis.

The left hand pushes the pillar horizontally, and when inhaling, reduce the force evenly to zero. Then, when exhaling, increase the force. If no force is exerted the stance is a wide bow gravity stake, and the load-bearing

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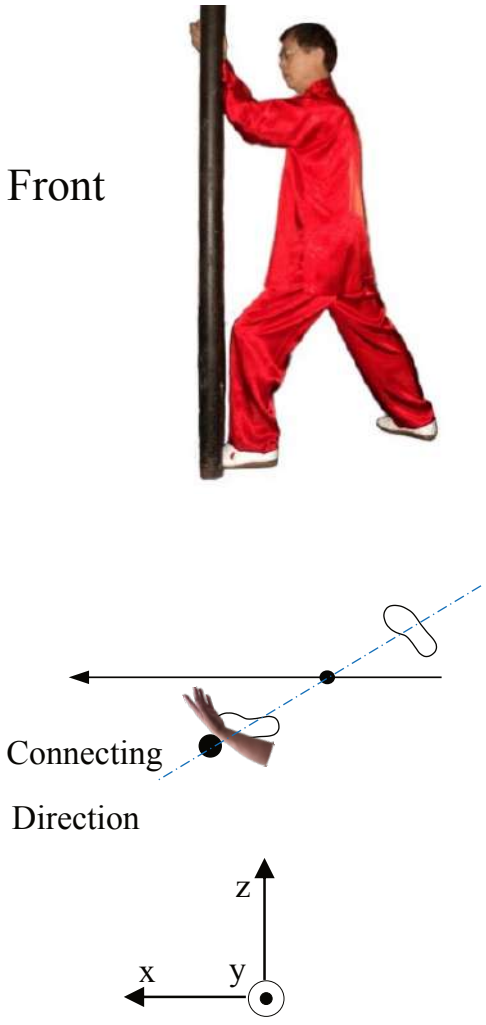

Fig. 36. Left bow lateral push stake.

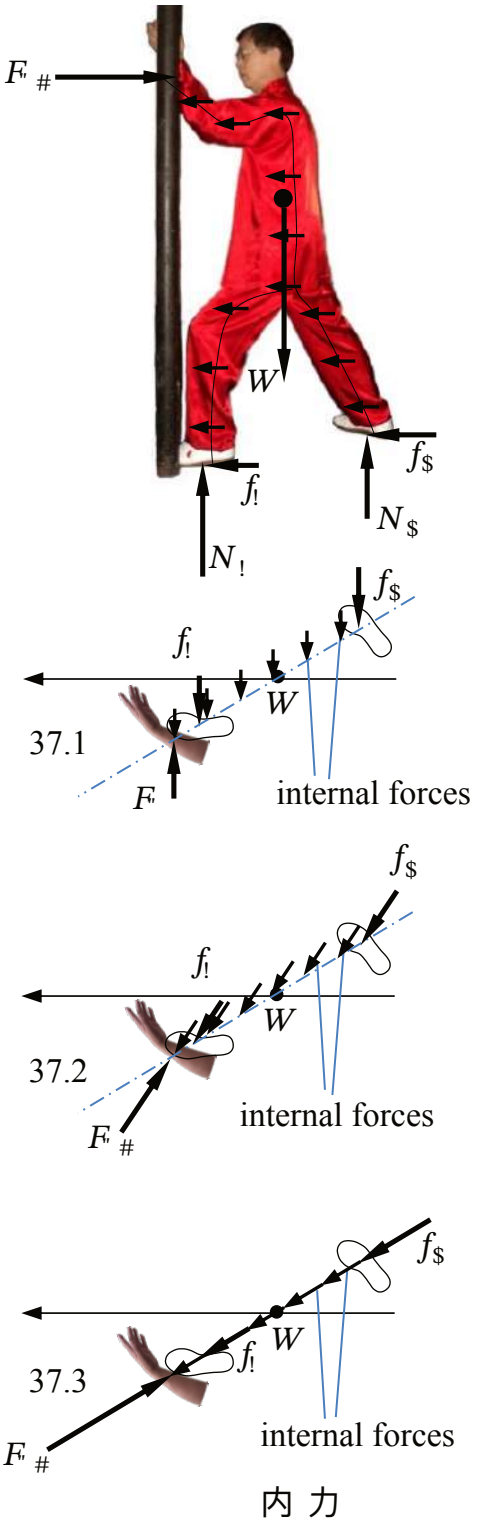

Fig. 37. The internal and external forces generated.

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capacity of the front foot is greater than that of the rear foot. The direction of the lateral force can be controlled. In addition, some longitudinal force can also be added if required, see 37.2 in Fig. 37. The right bow lateral stake and the left bow lateral stake are symmetrical, and once more no additional discussion is required. In general, it is recommended to take 8 deep breaths to create a single unit, with the number of units should be varied to the needs of the patient or the practitioner.

Discussion for Health Care Professionals

Though superficially these exercises may appear simple, these exercises differ substantially from those that are generally employed in standard physiotherapy. In physiotherapy the primary aim is often the desire to strengthen just one specific group of muscles at a time. This can be effective when just one muscle is weak relative to the other muscles, but in many cases the patients attending physiotherapy suffer from substantial strength issues over many muscle groups.

Here the aim of these exercises is to strengthen multiple muscle groups. This is beneficial as it generates better overall strengthening in multiple related muscles and tendons and thus these exercise can permits better overall control of the body and thus far better balance.

The secondary advantage is, through using one exercise to help breath control, and to work different muscles in different parts of the body, the time required to exercise can be reduced, and in some cases the reduction in time can be substantial. This can be important for patients who are not be able to stand for long periods of time, and also for those patients who might find it difficult to complete (or even memorize) multiple, sequential single-muscle exercises. Often they go home and fail to do follow up exercises. In addition, these exercises require very little space and (with the exception of the pull stakes, which requires a handle attached to the pillar) there is no need to purchase expensive equipment. In most cases, the corner of a wall can easily be used to replace the pillar. This makes the exercises cost-effective, especially for patients who have little or no income, and it also permits the patient to have more freedom over when these exercises are done, as the exercises ca be done anywhere there is a suitable corner. The final advantage is these exercises may also removes the need for travel to a gym, or to another facility to practice. This can be very important for treating patients who find it difficult to travel.

Reference

1. Master Jianfeng Chen, Taiji as Art - Masters Demo - Golden State Wushu, 2023, Youtube, accessed 2025, https://www.youtube.com/watch?v=51jYwPGayyk .
2. Jie Gu, Xupu Qin, Huaixu Li, Taiji Stake Work, Self Published, Amazon Paperback – March 23, 2022
3. 李光昭，《桩功概论》，华龄出版社，*2025*年*1*月。
*4.*金宏柱等 《新编针灸推拿经络穴位挂图》，凤凰出版传媒集团，江苏科学技术出版社 *2006*年*1*月。

DOI: 10.57612/2025.JTS.04.01