



“POWER BREAKING FOR DUMMIES”

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Brain - not brawn

The more one studies Taekwon-Do, the more one appreciates the thought behind every movement. In developing the art General Choi considered scientific principles. Breaking was no exception. But power breaking should not be confused with general breaking that one does in class. Breaking confirms (or negates) good technique. Power breaking on the other hand enables some liberties to be taken as the rules change. A timber target is not going to jump up and hit the kicker; there is no need to dodge an opponent; therefore we can take liberties with stances and technique resulting in even more power.

Recent studies show ¹.

Turning kicks producing more than **a ton per square inch**

(2264 lbs to be exact)

Front kicks producing 1888lbs.

A human skull takes 1400lbs to fracture

A side fist breaks a coconut with 1000lbs

A flying side kick travelling at 32mph hits an opponent like a motorcar accident, breaking ribs etc. A well trained and fit martial artist is able to train and take such blows

Observations at international events indicate that some 80% of ‘power breakers’ have little serious idea of how to break and are often there for ‘experience’ which should, perhaps, be gained at less important events.

Keeping it simple the physics behind power breaking ($P = \frac{1}{2} MV^2$) ².

‘Power breaking for dummies’ see it this way:

A 5 tonne bus travelling at 3kmh rolls towards a wall. On meeting the wall, the bus stops but the wall still stands.

A bullet weighing only grams, travelling at 5000 feet per second, speeds towards the same wall. On meeting the wall it blasts right through.

Question? How does such a small item obliterate the wall whilst a 5 tonne bus does not?

Key elements for a break to be successful include:

Concentration

“...by applying the impact force onto the smallest target area, it will concentrate the force and therefore, increase its effect.... unleash all your strength gradually and particularly at the point of contact ... the force must be so concentrated as to give a knockout blow...” ³.

Balance/Equilibrium

“...an unbalanced body is one easily toppled...the stance should always be stable, yet flexible...” ⁴.

¹. Extreme Martial Arts (2004) - Director of the Biomechanics Laboratory, Emory University, Georgia, USA

². Page 63 condensed encyclopaedia – General Choi Hong Hi (5th edition)

Breath Control

“...sharp exhaling of breath at the moment of impact tenses the abdomen to concentrate maximum effort on the delivery of the motion...”⁵.

Mass

“...the maximum body weight is applied with the motion by turning the hip. Another way of increasing the body weight is the utilisation of a springing action of the knee joint. This is achieved by slightly raising the hip at the beginning of the motion and lowering the hip at the moment of impact to drop the body weight into the motion...”⁶.

Speed

“...the most essential factor of force or power. Force equals mass x acceleration ($F = MA$) or ($P = MV^2$)...reaction force, breath control, equilibrium, concentration and relaxation of the muscles cannot be ignored. However, these are the factors that contribute to the speed, and all these factors, together with flexible and rhythmic movements, must be well coordinated to produce the maximum power.”⁷

To demonstrate these key elements, look briefly at a side piercing kick. **Generally speaking** there are three distinct methods often seen of executing this powerful kick:

In the **South Pacific**, power breaking is fairly classical (as taught by General Choi). It is strong and uses the science the General relied upon to gain power, particularly hip rotation (mass) and use of the large abdominal muscles, thighs and gluteus muscles. Exhaling just prior to impact is important. As mentioned above, unlike an opponent, the target is not going to counter attack; hence the student can take the liberty of kicking through the target rather than retracting following impact. (Fore-fist punch is a little more ‘interesting’ and I would like to see the science behind what is seen?)

The **English** tend to use “karate kicks” that lack hip rotation, relying on leg speed to break rather than coordination of muscle power. The key advantage of this system is speed - more important than muscle power. They are often medal contenders but perhaps could gain more gold if the more powerful muscle groups were used to their fullest extent. Imagine their speed being combined with muscle power?

The **Americans** tend to use a now outlawed technique that looks like a back kick, but actually ends up as a side kick (foot 15 degrees, hip only partly rotated etc). One main advantage is balance, but the major benefit of this system is the hundreds of untapped pounds of extra power can be gained by coordinating muscle power from the standing leg by pushing off the standing leg as you kick.

A ‘power breakers’ initial objectives should be two fold

- i) to ‘feel’ the technique
- ii) to break safely.

Train the brain – Wearing shoes for safety or pads to cover the target during the learning phase allow students to get the feel of the technique with confidence, knowing the possibility of injury is remote.

3. Page 52 condensed encyclopaedia – General Choi Hong Hi (5th edition)

4. Page 54 condensed encyclopaedia – General Choi Hong Hi (5th edition)

5. Page 57 condensed encyclopaedia – General Choi Hong Hi (5th edition)

6. Page 58 condensed encyclopaedia – General Choi Hong Hi (5th edition)

7. Page 60 condensed encyclopaedia – General Choi Hong Hi (5th edition)

The amount of timber broken is unimportant. Good technique and confidence are more important to perfect before increasing the thickness of boards. Ideally hundreds of single board breaks should be practiced before increasing the amount of timber broken. However, breaking 30-50 times before changing your breaking requirements increases the chances of muscle memory without it becoming monotonous.

A good coach with an eye for details can site an unwitting slowing down of an attacking tool just before impact. Be aware of muscle tension before contact. A relaxed body, good technique, and confidence are the name of the game. Development of good technique before starting 'power breaking' avoids negative or bad habits.

Risk factor

A 3rd degree preparing for his 4th degree executed a (downward) side-fist strike. On his first attempt a bone broke in his hand as he missed the centre of the target and struck the side of the holder. Shameful in some ways as someone of such 'experience' and 'seniority' had little idea of how such a simple technique should be executed. ⁸.

Similarly, at another breaking seminar, three senior students (red and black belts) required medical treatment in the first 30 minutes, when all three failed to heed the instructions regarding safety gear e.g. shoes with thick socks. The most serious case involved 2nd and 3rd degree black belts who 'knew it all' ^{8a}.

Yet another 4th degree applicant indicated his final power breaking requirement was "a hand technique, that if his hand broke, it did not matter as it was the last requirement of the testing." ⁹.

All breaking activity has a risk factor that is high, medium, or low. Any injury, however slight, is **unacceptable**, and generally indicates bad technique or ignorance.

Notes on the Body

With correct equipment, teaching, and supervision a young person can be safely taught correct breaking techniques. By using 'older' or 'weaker' rebreakable boards of varying thicknesses, ensuring shoes, gloves and/or pads are used, and under close supervision of an experienced coach, injury is minimised.



5 board side piercing kick by 10 year old Rikki Lee - to ensure it was not a 'fluke', a second break was arranged (also successful)

Note - shoes and thick socks ensure injury prevention

8. Breaking seminar, Brisbane, Australia

8a. Breaking seminar, Sunshine Coast, Australia

9. Australian 4th degree testing, Colorado, USA

The heel is one of the strongest bones in the body. ¹⁰ Young people are generally restricted to heel breaks eg. Side-kick, back-kick. One needs to consider age, strength, and ability. A student junior in age, who has insufficient strength to break, will generally not have sufficient strength to damage joints or growth plates. A junior who **does** have the strength to break generally has sufficient muscle and bone development to cope with any impact provided. ¹¹.

Consider age-based differences in power to weight ratio and bone strength eg. Juniors are more flexible though bones are weaker. Older bones are less dense and often more brittle. Younger/older students should not try to match the high performers. The consequences are obvious.

Forging

Strengthening the bone, tendons and muscles behind the breaking tool is vital. Regular TKD strength exercises will help e.g. push-ups on knuckles, squats (with weights) etc. A well thought out weight training program will assist also. ¹² Dozens of preparatory (single boards) breaks can be considered forging in most cases.

Strength Training

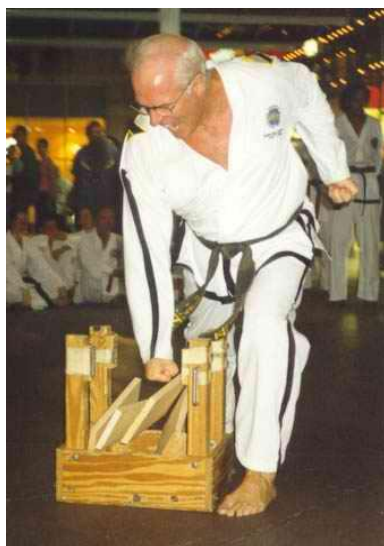
A serious hand breaker should develop strength to the muscles of the hand and wrist as associated muscles augment bone/joint stability. The most obvious example is the tightening of the fist, which is paramount to hand breaks. Wrist curls are useful.

Confidence and Technique

Once confidence and good technique are developed, substitute safety shoes with a pad covering the boards. Eventually remove pad, and break boards without protection. Confidence is a different concept to technique but is probably developed in tandem allowing energy from a hand/foot to be transferred to the target.

The force generated is dependent on the rate at which your momentum (speed) is transferred. A target absorbs energy by deforming before it breaks. An attacking weapon should not deform (or at least be kept to a minimum) though it is generally the flexibility of the body that prevents the body breaking.

Work done on the target during contact is absorbed and if the threshold force is not achieved (i.e. no break) then that energy will be turned back on to the attacking weapon. This is when any risk of injury is amplified.



The author demonstrates a fore-fist punch



Master Dale Burkhart (USTF) – concrete tiles

Hands

The structure of the wrist and hand is often not fully appreciated. The allowable movements are critical to safe breaking of the target rather than bones. Wrist bones in juniors (the 8 little carpals) are the last to calcify and are subject to easy fracture.

Your wrist is more stable in a fore fist strike and a knife-hand though the head of the radius (forearm) bone loses density with age.

Palm strikes are high risk for wrist fracture. Reverse knife-hands are very high risk and are for specialists only. Bones in the hand are still developing to the age of approximately 18 years.¹³ Children's bones should be considered similar to 'chicken bones'. Fore-fist punches in children should be restricted. Side fist strikes are more desirable.

Women often are not encouraged to punch. There are physiological reasons why women should limit their fore-fist punch. Physiologically women often have longer fingers, preventing proper formation of a fist, a women's bone structure is often smaller, raising the possibility of damage, and dependant upon age, bone density is often less than a male of similar age. General Choi always preferred women's hands to be 'lady like.'

Feet

Bones in your feet should be treated similarly to those of your hands though they have a lower fracture risk than the hands. Tarsals (equivalent to the carpals) calcify earlier in growing children. The ankle is a more stable structure. The calcaneus (heel) is extremely strong therefore side/back kick breaks are the safest. Without specialty equipment, children of tender years should avoid turning or front kicks.

Bag and kick pad work

This is essential for power breaking as it builds confidence, power, and technique.

Women

Generally speaking bones in both male and female have reached their maturity at 18 years of age.¹⁵ At that time male bones are generally larger and denser than that of a female. Growth remains the same until 28 years of age (approximately) when both sexes start losing bone density at the rate of 1% per year. As a woman reaches menopause a bone density loss of up to 7% per year can be expected. By the completion of menopause women may have lost up to 40% (or more) bone density.¹⁴ Power breaking falls into a high-risk category for these people. Fore-fist punches are a high-risk activity for women of any age due to their physiological make-up. As a result women often have difficulty forming a good fist). 1 x 1" of timber is the most that should be attempted and even this is a high-risk activity.

Men

Shock/Horror – We now know males lose bone mass at about the same average rate (1% per year) as women but do not have the effects of menopause and generally have greater bone mass to start with.¹⁶

10. Dr Gerald Woollard, Medical Scientist, ITFNZ 2nd degree, Pakuranga seminar (1989)

11. Dr Gerald Woollard, Medical Scientist, ITFNZ 2nd degree, Pakuranga seminar (1989)

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13. University of the Sunshine Coast, Qld, Australia (1998)

Equipment

People look for the loud crashing/breaking noise during a successful break. Immediate feedback to a student following a break is imperative. Consider using half-inch boards, or even spacers. Avoid unnecessary protrusions. Minimise the potential for accidents.

Rules

Prior to competition, ensure you know the rules being used at that event...they differ, in some cases, substantially e.g. 50 seconds to break/30 seconds to break; May touch when measuring/may **NOT** touch when measuring.

Common faults:

Recent observations show participants:

Not looking at target prior to breaking – and not focusing on the target as the break occurs

Closing eyes before break – visualising?? In reality, momentum is affected. The body can hold a 'charge' for about 1/5th second

Rising kick instead of sidekicks – not loading (chambering) the leg properly prior to the break

Use of muscle power instead of body power

The incorrect tool being used – eg knife hand strike

Not using off hand/off leg – studies show the offhand develops approx 33% of power in a technique

Finals play offs – tensing up instead of relaxing more/shortening the stance prior to breaking – competitor is not in control

Angle of a kick – eg for every 1 degree rise (in a side kick) is a few pounds loss in power going into the target (it starts to deflect off the target)

Tips for power breaking

Relax prior to break

Slow stepping – fast execution

Load leg – avoid half turning/rising kicks

Use opposite leg/arm

Practice in front of a noisy crowd (try it – check initial results)

Build muscle memory – dozens of small breaks (1 board) to get the feel of the technique required

Protect the body – shoes/glove during the learning states

Enter as many competition events as possible – **IF** rehearsed beforehand

On the day (where possible) break, break, break prior to the event

CONCLUSION

“The proof of the pudding is in the eating”

14. University of the Sunshine Coast, Qld, Australia (1998)

15. University of the Sunshine Coast, Qld, Australia (1998)

16. University of the Sunshine Coast, Qld, Australia (1998)



Jon Sawden (Thailand concrete) during 3rd dan grading



Dr Gerald Woollard – training in Thailand



Master Rocky Rounthwaite – 10 tiles, Auckland, NZ



Nichola Tse – 6 tiles, Auckland, NZ



Ryan Khul during his 1st degree grading, Thailand



Master Rocky Rounthwaite – 8 boards before dinner!!