TKD Movement Fundamentals 101

By Nick Lee, November 2013

"… look first to the stance and position (movement) of the feet…"
Grandmaster Pablo Trajtenberg at the 2006 IIC … instructing and correcting students.

Introduction

In my roles as a Taekwon-Do Instructor/student and Personal Trainer over the last few years I have had an opportunity to observe and think about the movement biomechanics of myself, my students and clients from three different perspectives:

- Powerful Taekwon-Do movement and techniques
- Strength & Conditioning
- Injury Prevention.

The quote and advice above, which I remember hearing from Grand Master Pablo Trajtenberg in an IIC session, holds true from all three perspectives as our feet are our primary connection with the earth and combined with the stance(s) we adopt, provide our platform for all of our "upright" weight bearing movement.

The focus of this essay is to share some of my observations and thinking on "knee spring" stemming from applying this simple advice.

Background

As a student of Taekwon-Do, no doubt I'm like many others – as my journey progresses, I become increasingly more interested in improving my movements, breathing and mental focus in order to better understand the application, execution and philosophical basis behind the art of Taekwon-Do.

The composition of Taekwon-Do is based on an endless system or "cycle" of inter-related training attributes – Fundamental Movements, Patterns, Sparring, Dallyon and Self Defence Technique – which the student must continually cycle around in pursuit of his/her mastery of the art of Taekwon-Do.

As General Choi Hong Hi states in his encyclopaedia: (Vol 1 page 237)
"The student will constantly find himself returning, however, to his fundamental movements, even when he has achieved the highest possible degree of proficiency in self-defence techniques."

With the above in mind, I have chosen to have a closer look at "knee spring", and the initial junior Gup (10^{th} -7^{th} Gup) Taekwon-Do fundamental exercises and patterns to help illustrate my thinking.

Fundamental Movements and Patterns

- Sarju-Jirugi
- Sarju-Makgi
- Chon-Ji
- Dan-Gun
- Do-San

The above introduce the student to the following stances – Parallel Ready stance, Walking Stance, L-Stance, Sitting Stance.and the following types of movement – single stepping (forwards, backwards, side-to-side), single step-turning, spot-turning and stationary (continuous motion and fast motion). These stances, and the movements used to transition between them, lay the foundations for all the more advanced Taekwon-Do techniques and movements to follow.

As a student of a few years now, and as General Choi prescribed, I have come to value these initial exercises and pattern movements as a means of continually fine-tuning my own understanding and execution of our "Sinewave" motion – breathing coordination and the movement transitions between our key stances (Walking," L", Sitting and Parallel Stances).

From an instructor perspective, these same movements and patterns provide an insight into the students "grasp" (whether senior or junior rank and from both a physical and mental conditioning perspective) of the fundamentals of powerful Taekwon-Do movement.

From an "exercise prescription" perspective, observing a student performing these same movements/patterns provides an insight into how biomechanically sound their movement is and will highlight physical weaknesses that may be hindering proper execution and/or setting them up for potential injury. In this regard, three of the four initial static stances themselves require a certain level of physical conditioning if we are to execute them properly before we even consider the movement required to transition between them – try spending 10 minutes in one Walking, Sitting or L-stance!

However the real challenges show up when we begin to move from one stance to the next and in sequences as prescribed by our patterns.

Where do we start…?

As always a good place to start this discussion is with General Choi's own words from Vol 1 page 80 of his encyclopaedia:

> *"An old proverb says that even heaven cannot make a diligent worker poor.*
>
> *However in Taekwon-Do diligence or intensive training alone does not produce quality techniques…… under the proper guidance of a competent instructor, a student who trains earnestly with dedication will learn the true techniques of Taekwon-Do in a comparatively short period of time with less effort. On the contrary, instructions from a false or unqualified instructor would be worse than not being taught at all because unscientific movements not only reduce the power but require a tremendous amount of time to correct"*

The message I take from this is that hard training in and of itself is certainly required but it is necessary to be constantly on alert as to the "what" and "how" of your training and that good quality instruction is paramount.

General Choi's 15 volume encyclopaedia is obviously the definitive Taekwon-Do instruction manual and is therefore always the first point of reference when considering the "what" and "how" of technique. Accordingly the following references are the basis for my thinking and discussion that follow. However as with all instruction manuals, interpretation is necessary and the subsequent discussion and thinking is offered with the view to gaining further clarity myself, and hopefully contributing positively to the wider thinking and understanding of this aspect of the Art of Taekwon-Do.

General Choi specifies nine "Training Secrets" that underpin all Taekwon-Do technique:

Training Secrets *(Encyclopaedia Vol 1 page 80)*

Students should keep in mind the following secrets:

1. To study the theory of power thoroughly*.*
2. To understand the purpose and meaning of each movement clearly.
3.To bring the movement of eyes, hands, feet and breath into a single coordinated motion.
4. To choose the appropriate attacking tool for each vital spot.
5. To become familiar with the correct angle and distance for attack and Defence.
6. Keep both the arms and legs bent slightly while the movement is in motion*.*
7. All movements must begin with a backward motion with very few exceptions.
8. To create a sinewave during the movement by utilising the knee spring properly*.*
9. To exhale briefly at the moment of each blow except connecting motion.

For the purpose of this discussion on "knee spring", the "secrets" in **bold** above are key. Similarly, the elements of primary relevance for the Theory Of Power below are in **bold**:

> **The Theory Of Power** *(Vol 2 pages 14-47)*
>
> - *Reaction Force*
> - *Concentration*
> - ***Equilibrium***
> - ***Breath Control***
> - ***Mass***
> - ***Speed***

The defining and much discussed "sinewave" motion is generated by how we move our lower body, which is our foot work and movement from the waist down[1]. The essential key to this movement as General Choi states very succinctly is "*...utilising knee spring properly.*"

There are different sinewave motions for different applications. For example different sinewave motions need to be matched with the "intent" of a given technique… fast, slow, continuous or connecting[2] …and sinewave motion also depends on our stance and whether we are stationary (in our stance), executing more than one technique, or moving between stances (single stepping forward/backward or turning step/spot).

Sometimes there is no knee movement, for example:

1. Hwa Rang move 27 – Closed Stance <u>stationary,</u> left inner forearm outward side block, 2/3 sinewave (Plantar flexion of the ankle only - heels move up and down with no knee bend);
2. Hwa Rang moves 2 & 3 – Sitting Stance <u>stationary</u> while executing a right front punch followed by a left front punch in "normal" motion – sinewave is created without the heels leaving the ground but still with ankle, knee and hip flexion/extension.

Therefore we can deduce that there must be variations of "knee spring" and "properly" – to the extent that some variations don't involve bending (flexion/extension) the knee!

Once again for this discussion, I want to focus in on the actual mechanics of the motion itself and what I think is meant by "knee spring" and how the "*proper use*" of it generates sinewave which in turn enables us to transition (move) naturally from one stance to the next both powerfully and safely from a biomechanical perspective.

---

1 Noting always of course that we are an integrated "whole system" of mind, body and spirit and my comments should obviously be taken in this context throughout.

2 "Sinewave Study" by Master Paul McPhail (2004) – Appendix 1.

Knee Spring…what does it mean?

We can see that General Choi placed a great deal of emphasis and importance on "knee spring" – we have clear instructions as to why we use "knee spring" as it is specifically mentioned, initially in *Training Secrets – Sinewave* and then again in the *Theory Of Power & Equilibrium*. However as far as I have managed to research thus far I have not found detailed instruction as to the how and what exactly is meant by "*properly*" using "knee spring".

This may explain, in part[3], why many new students (including myself) have difficulty initially mastering this aspect and then subsequently consistently applying it throughout the extensive range of Taekwon-Do techniques and stance transitions we encounter as we progress through our patterns and techniques.

Let's have a look at "what" knee spring is not…

I often observe new students trying to initiate sinewave using a simplistic "down-up-down" interpretation, which results in them doing various versions of "static" ducking and bobbing as they bend both their knees and lower their buttocks unnaturally, usually just before they step forward or backward. For the most part this involves both legs simultaneously bending with no forward /backward motion or change in weight distribution between legs, and both feet typically remain "flat" on the ground during this "ducking" motion. This is definitely not the way to generate powerful dynamic motion.

"Knee spring" on the other hand (or should that be leg?) is the mechanism by which we can support our bodyweight dynamically (during upward, downward, forward and rotational combinations of movement), in balance, and primarily,[4] while moving on one leg. In large part Taekwon-Do is ALL about maintaining our balance on one leg to enable us to move, turn, kick, jump and recover.

From a musculoskeletal perspective, three major leg joints[5] - the ankle, knee and hip - need to provide coordinated flexion and extension to create knee spring. This flexion/extension movement needs to be dynamically managed throughout the many Taekwon-Do movement sequences. This requires the appropriate strength, flexibility and muscular control (proprioception[6]) throughout the "lower body kinetic chain" - from our abdominals down to our toes.

The key word here is "dynamically" – as General Choi states in the *Theory Of Power* and *Equlibrium (Vol 2 page 24):*

---

3 How to "use knee spring properly" requires strength and conditioning and an understanding of the intent of what you are trying to achieve by using it.

4 There are exceptions where sinewave and "knee spring" are used in stances involving both feet/legs weight bearing.

5 Toe flexion/extension is also critical (especially that of the primary or "big" toe).

6 Proprioceptors are specialized sensory receptors on nerve endings found in muscles, tendons, joints, and the inner ear. These receptors relay information about motion or position and make us aware of our own body position and movement in space. Proprioceptors detect subtle changes in movement, position, tension, and force within the body.

> *Equilibrium is classified into both Dynamic and Static stability. They are so closely inter related that the maximum force can only be produced when the Static stability is maintained through Dynamic Stability.*
> *To maintain good equilibrium, the centre of gravity of the stance must fall on a straight line midway between both legs when the body weight is distributed equally on both legs. Or in the centre of the foot if it is necessary to concentrate the bulk of body weight on one foot .*
> ***The centre of gravity can be adjusted according to body weight. Flexibility and "knee spring" are also important in maintaining balance for both, quick attack and instant recovery.***
> *One additional point; the heel of the rear foot should never be off the ground at the point of impact. This is not only necessary for good balance but also to produce maximum power at the point of impact.*

Paragraph two above is referring to static stability, and paragraph three (in **bold**), emphasises that "knee spring" is key to adjusting our centre of gravity when in motion and why this is important from a Taekwon-Do attack and defence perspective.

A simple way to demonstrate "knee spring" *may* be to "hop" up and down on the spot on one leg. If you have reasonable biomechanics and muscle tone in the arches of your foot, calves, knees, thigh, gluteus and abdominals and have already developed a basic "firmware package" that enables you to hop on one foot (if not, you may find Appendix 1 "Use it or Lose it …?" interesting), then you will find that you naturally end up "bouncing" on the ball of your foot with minimal heel contact on each hop. If you are able to successfully execute the above then you have just experienced an example of "knee spring".

As you can see from this simple exercise, the knee is only one component of an integrated lower body "system" that needs to be conditioned and trained appropriately to enable us to generate "knee spring" properly when executing Taekwon-Do movement as General Choi intended.

So, in summary to this point, "knee spring" can be thought of as the "sum of the moving parts" - how we move all our individual lower body "parts" to perform coordinated and specific movement sequences in time and space.

Thinking about "knee spring" as describing our *complete lower body system of movement* gives a more accurate description of the "what" is involved when we simply refer to "knee spring".

Hence, the physical condition (strength and flexibility) of each "component" and operating as an integrated "hardware and firmware system" (abdominals, gluteus, thighs, calves, and foot arches) in conjunction with our existing "proprioception firmware" (refer fn 6) will have a significant impact on how well we can perform our Taekwon –Do "knee spring".

Physical strength and conditioning is often the most significant factor impairing the performance of "knee spring" early in a students Taekwon-Do journey (refer Appendix 1 "Use it or Lose it…?" and fn 3).

Suffice to say here that physical conditioning is at the heart of all Taekwon-Do practice and the student should always be looking to target training exercises at physical weakness areas to become a balanced practitioner. There are obviously many and varied ways to condition flexibility and strength in the lower body[7] necessary for "knee spring" – our simple hopping exercise and variations like skipping etc are an excellent start. However in addition to physical strength and conditioning we need to develop our firmware programming for the many potential scenarios of technique combinations and for that, our patterns are by far the best exercises to achieve this.

Consequently, the more time taken to fully understand this concept and then to properly train our movement patterns to condition our body and fully embed or program in "muscle memory" from the beginning of our Taekwon-Do journey, the more readily advanced movement sequences can be learnt and executed correctly with "knee spring" becoming natural motion.

Fundamental Steps 101

As an exercise in assessing what stepping movements General Choi prescribes that the beginner should practice to begin his/her Taekwon-Do journey and specifically develop footwork and sinewave ("knee spring"), I did a quick analysis of the individual steps a junior (10^{th}-7^{th} Gup) must exercise to gain his/her first three grades.

Interestingly the two Fundamental Movements and first three Patterns require the student to complete 101 stepping movements if we include the return movements back to Junbi (we would normally only count 94 steps and I have not included the intermediate release position in Do-San move 7(a) – but 101 makes an interesting and fitting heading!).

Movement Type	**Number of Occurrences**
Forward Steps	44
Backward Steps	4
Stationary	9
Forward Spot Turn	2
Forward Step Turn - Clockwise	7
Backward Step Turn - Clockwise	17
Backward Step Turn – Anti-Clockwise	18
TOTAL	101

(Refer to Appendix 2 for further breakdown of the "steps".)

Clearly, from the frequency of occurrence, Walking stance forward stepping is the most used, and from experience this is the simplest movement to practice as far as gaining understanding of sinewave and "knee spring".

Following that, Backward Step Turning in either Clockwise or Anti-Clockwise direction is the next most frequent. However there are 8x180 deg backward step-turns all of which are

[7] A full topic all on its own!

clockwise, four of these occur in the first pattern Chon-Ji. So continuing our discussion on the "how" of "knee spring", we will look at these two movements in particular.

How Do We "….use knee spring properly"

If you think that my description of the "what" of "knee spring" was lengthy then consider this…the "how" will literally take you the rest of your Taekwon-Do journey as you increase your repertoire of techniques at each new Rank and discover the subtleties and nuances of movement required of the almost endless combinations and possibilities as you progress up the ranks. All of which you will continually add in to the composition cycle of your training.

However, as an introduction to some of the principles of the "how", based on an excellent resource presented by Master McPhail at a Wellington technical seminar in 2009 and some of my own thinking thus far, here goes…

In addition to the "training secrets" and "the theory of power" I find it useful to also apply the following principles which I believe to be valid when it comes to "knee spring" mechanics for stepping and turning:

- Once in motion, body weight is supported primarily on the "ball" of <u>one</u> foot throughout the entire movement until the "new" attacking or defensive stance is completed. Noting of course the last point made by General Choi (above) with respect to equilibrium and the back foot heel at point(time) of impact.
- Sinewave motion is used to "load", weight and un-weight, the supporting ball-of-foot correctly during motion.
- The knee of the supporting leg should remain aligned with the direction (toes) of the foot at all times.
- The torso should be vertically balanced over hips throughout stepping and turning motion.

Notes:

1. There may well be additional useful principles that apply however the above are the ones that I believe to be valid based on my observation, reading, questioning and experience thus far.
2. Some intermediate positions requiring two feet to be in contact with the ground momentarily – when this occurs both feet will generally be "loaded" (the release move 7 in Do-San is an example).
3. "Loaded" is defined as weight on the ball of the foot(feet) with the ankle, knee and hip flexed. The heel(s) will generally be slightly off the ground but may be "just" touching the ground with no weight applied.

Walking Stance Stepping Forward

Please refer to the sinewave diagram illustrating walking stance stepping motion as defined by the ITF Technical Committee (Appendix 3). Using this diagram I will "talk" through my understanding of its application as follows:

Phase 1: To initiate the sequence, think of a "rolling" motion (in this case forward – however the same applies to backward or turning motion) and focus on relaxing/sinking your hips slightly (Yin energy) breathing in. As you do this shift your hips toward the leg that is to carry your weight, bending(softening) slightly thru the front (in this case right) knee, with the intent of centring your weight on the ball of the supporting foot with the your supporting ankle, knee and hip in a flexed position.(Diag posn "B"). The moment at which all your weight is fully on your "supporting" leg and balanced on the ball of your foot completes the "downward cycle of sinewave" or "spring loading" phase (After "B" and Just before "C").

Phase 2: At this point you move your stepping leg forward, keeping it slightly bent and bringing your hips full facing, while slight releasing some of the compression (energy) of the initial downward movement. You are now at point "C" this is the point at which your hands and arms reach their neutral intermediate position. From this loaded position, we begin to raise hips and torso up (still breathing in building Yang energy) by pushing through the primary arch of your supporting foot coupled with the calf-thigh-gluteus and abdominals and straightening (but not fully) the supporting leg. This upwards "extension" motion, generated by the supporting leg, also "un-weights" the ball of the foot allowing it to pivot as necessary to support hip rotation and turning (pivoting) if required. It is also during this upward movement phase that "counter rotation" at the hip is generated in support of the hands and arms moving backwards before the forward movement of the associated hand technique. At the instantaneous "apex" point of this upward movement (dia. Posn. "D") the supporting leg is extended but not completely straight, weight is on the ball of the foot, backward motion is complete in final preparation for rapid acceleration to the final attacking or blocking technique. This coincides with the rapid downward motion "step" into the final stance as you exhale rapidly generating intra-abdominal pressure (full Yang energy). At this precise "end" point, weight is fully transferred onto both feet simultaneously as the supporting foot (now the rear foot) pivots and the heel is "snapped" into place forming a straight back leg in the new stance with the foot at appropriate 25 degs. and the stepping foot is placed in the appropriate stance position.

Backward Step Turn 180 deg Clockwise

Please refer to diagram Appendix 4 – *Encyclopedia Vol 8 page 127 move 3 Chon-Ji Tul.*
Note that the movement sequence is shown from left to right and the first image shows the right walking stance punch (move 2) toward "B". Applying the same principles:

Phase 1: To initiate the backward movement, think of a "rolling" motion and focus on relaxing/sinking your hips (Yin energy) breathing in. As you do this shift your hips backwards toward the leg that is to carry your weight, in this case the left, bending(softening) slightly thru this knee, with the intent of centring your weight on the ball of the supporting (left) foot with the your supporting ankle, knee and hip in a flexed position. (Similar to position "B" previously - note at this point you are still facing "B".) The moment at which all your weight is fully on your "supporting" leg and balanced on the ball of your foot completes the "downward cycle of sinewave" or "spring loading" phase.

Phase 2: At this point you move your stepping leg backward toward your supporting foot, keeping it slightly bent and rotating your hips slightly clockwise, while slightly releasing some of the compression (energy) of the initial downward movement. You are now at a point just before "the middle image" - this is the point at which your hands and arms reach their

neutral intermediate position. Your torso has begun to rotate clockwise and you are looking over your shoulder, your supporting leg is about to initiate.

From this loaded position, we begin to raise hips and torso up (still breathing in building Yang energy) by pushing through the primary arch of your supporting foot coupled with the calf-thigh-gluteus and abdominals and straightening (but not fully) the supporting leg. This upwards "extension" motion, generated by the supporting leg, also "un-weights" the ball of the foot allowing continued hip rotation and pivoting on the ball of the supporting foot. During this upward movement the blocking arm is also moved counter rotationally until at the apex of this upward and rotating motion the instantaneous crossing position for forearm low block is reach (this is the position shown in the middle image).

At this instantaneous "apex" point of upward movement the supporting leg is extended but not completely straight, weight is on the ball of the foot, backward arm motion is complete in final preparation for rapid acceleration of hip and block tool to the final blocking position. This coincides with the rapid downward motion "step" into the final stance as you exhale rapidly generating intra-abdominal pressure (full Yang energy). At this precise "end" point, weight is fully transferred onto both feet simultaneously as the supporting left foot pivots and the heel is "snapped" into place forming a straight back leg in the new stance with the foot at appropriate 25 degs. and the stepping foot is placed in the appropriate w-stance position.

The diagrams don't show…..
With respect to Walking Stance Stepping Forward, what is not clear in this diagram is where the weight is being carried on the supporting foot (evenly distributed or on the ball of the foot?) but what we do know from the encyclopaedia is that while on one leg our centre of gravity should fall through the centre of our foot – laterally, and when moving we can use knee spring to adjust our centre over our foot "fore (toe) and aft(heel)". However from my own training experimentation and observation of the footwork of a number of senior Taekwon-Do practitioners my conclusion is that during stepping and in particular during turning (pivoting) motion the heel of the supporting foot should <u>not</u> carry weight. Also the centre of gravity (and centre of rotation if turning) is maintained through the ball of the foot by dynamically controlling the flexion/extension of our hip knee and ankle of our supporting leg until the final instant when the next full stance is completed.

Maintaining our weight on the ball of our foot keeps our "spring" loaded which enables us to dynamically alter our **hip** (flexion, rotation and height), **knee** (flexion/extension) and **ankle** (plantar/dorsi flexion) to maintain our stability. With training conditioning and repetition we programme our firmware "proprioceptors" and this integrated system of flexion and extension or "knee spring" enables us to control our "loading"(weight on the ground), the acceleration/deceleration of our forward and backward movement, and at our hip/torso rotation and counter-rotation.

With respect to Backward Step Turn 180 deg Clockwise, the encyclopaedia "Foot Diagram" (middle image) associated with "intermediate -crossing" position of the 180 step turn would suggest the supporting foot at this point as having full weight on a "flat" foot – I believe this is not the intent but more a depiction of where the foot has rotated to or pivoted to by this stage of the pivoting motion, and in fact that the weight is being supported on the ball leaving

the foot free to pivot smoothly and safely. This is a consistent depiction of "intermediate positions" throughout the encyclopaedia and I think the same intent applies throughout.

Also this particular example (Move 3 of Chon-Ji) of step turning is the first time a 180 degree turn is used in our patterns and for the beginner provides a real challenge to control their equilibrium. The interesting thing is that many beginning students actually do turn exactly how the encyclopaedia foot diagram depicts – as they fail to maintain their centres of rotation and the heel of their supporting foot not only grounds but then becomes the "new" centre of rotation that they then shift their foot around. This is one of the classic "tells" I look for and the causes can be numerous but is usually due to poor strength and conditioning of the lower body in the beginner student. The impact of this from a Taekwon-Do perspective is loss of balance, power and poor technique – if in combat potentially death.

From a safety perspective this grounding of the heel mid rotation can cause serious injury if not as a sudden event, then certainly overtime as repetition of this poor movement technique puts unnatural rotational load through the knee and ankle in particular.

Conclusion

"Knee spring" is key to maintaining our balance in motion and we also use it to control the cadence/pace and rhythm of our movements which in turn allows us to control the acceleration (and deceleration) and power of our techniques. In other words we can dynamically modify the timing and "shape" or frequency and amplitude of our sinewave motion to suit the technique and motion we need.

Using "knee spring" **properly** requires practising a high number of movement repetitions correctly to programme our proprioceptors or muscle memory. Our patterns provide an ideal programming tool for doing this over a wide range of Taekwon-Do technique combinations. When it comes to programming your movements with repetition, be sure you understand what it is you are programming and heed the warning from General Choi "*….because unscientific movements not only reduce the power but require a tremendous amount of time to correct."*

When all the above is considered I hope this discussion has given the reader some pause for further thought and shed some useful light on a seemingly simple aspect of our Taekwon-Do movement yet requires so much of our training effort, both physically and mentally, (whether we realise it or not) in the pursuit of "*..using knee spring properly*" .

APPENDIX 1

"Use it or lose it…"

Our modern urbanised lifestyles focus so much of what we now need to do in our daily lives and often what we also then choose to do in our leisure time involves **sitting!** As a result, individually, young and old, as a population, we are losing the ability to move well and are less healthy for it![8]

Alarmingly many of the new young students (under 18 yr olds) I see come into our Do-Jang these days are lacking the motor skills and coordination that I would have taken for granted at their age and have many of the muscle imbalances and biomechanical issues I would expect to see in an office worker of 40 years!

From my observation, in the case of 30 years+ adults, its generally a case of "forgotten how" but increasingly for many under 30's it's a case of "don't know how" when it comes to half way reasonable motor skills/conditioning and biomechanics. These same deficiencies are not only a risk factor for injury (and longer term poor health) but also make the execution of even simple fundamental Taekwon-Do movements difficult and in some cases unachievable without additional appropriate and significant physical conditioning.

No doubt it has always been the case that specific conditioning as prescribed by General Choi Hong Hi in his encyclopaedia has and will always be a central pillar of the Taekwon-Do training system, however these days, the average level of physical condition of people young and old who are *beginning* their Taekwon-Do journeys is, I suspect, far worse than it was in General Choi's day. And is, unfortunately, likely to continue on a downward trajectory.

In my opinion this will place greater emphasis on Instructors becoming increasingly more skilled at recognising specific functional (conditioning) weaknesses in their individual students and having training strategies to meet their individual needs if we are to grow our classes, avoid students injuring themselves,[9] and help students develop strong Taekwon-Do technique efficiently.

---

[8] There have been a number of recent research papers on the effects of sitting on human health and the common conclusions emerging are that sitting is bad for your long term health and potentially will shorten your life expectancy.

[9] There is another whole discussion on where Taekwon-Do instruction/conditioning starts and finishes and where the individual students own responsibility for health and fitness meet.

APPENDIX 2

SINGLE STEPPING											
W-W FWD	W-W BKWD	W-L FWD	L-W FWD	S-S FWD	S-S BKWD	S - P FWD	S - P BKWD	W - P FWD	W - P BKWD	P - W FWD	P - W BKWD
29	2		11	1				1		2	2
48											

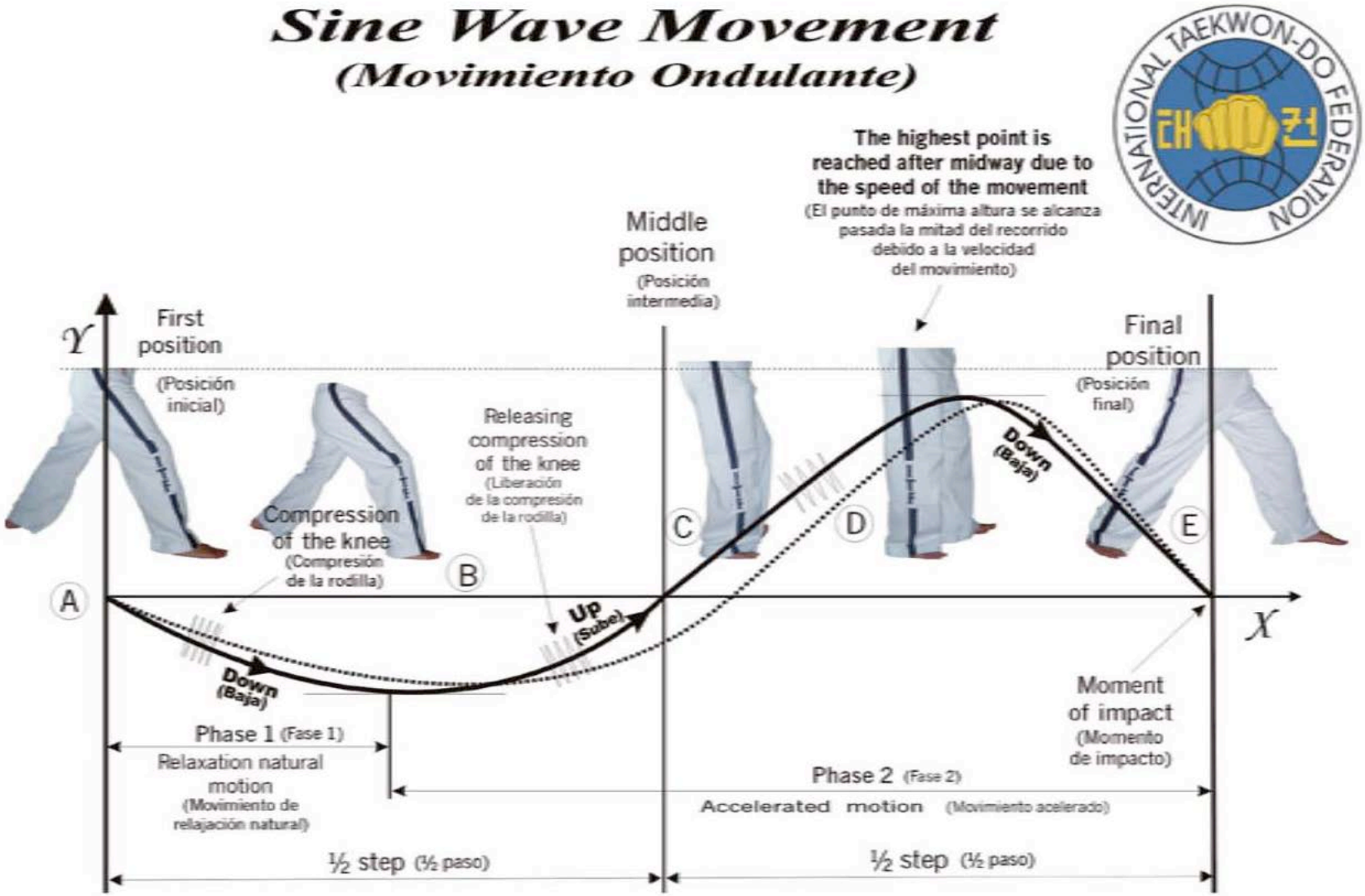
SPOT-TURNING							
On Front Foot		On Back Foot		On Front Foot		On Back Foot	
(L) W-Stance CW	(R) W-Stance ACW	(L) W-Stance CW	(R) W-Stance ACW	(L) L-Stance ACW	(R) L-Stance CW	(L) L-Stance ACW	(R) L-Stance CW
2							
2							
2							

STATIONARY		
W-Stance On-The-Spot	L-Stance On-The-Spot	ONE FOOT (KICKING)
7		2
9		

FORWARD STEP TURNING On the Front foot - Turning Clockwise				FORWARD STEP TURNING On the Front foot - Turning Ant-Clockwise			
(L) Stepping Back	(R) Stepping Back	(L) Stepping Fwd	(R) Stepping Fwd	(L) Stepping Back	(R) Stepping Back	(L) Stepping Fwd	(R) Stepping Fwd
							7
				7			

BACKWARD STEP TURNING - Turning Clockwise				BACKWARDS STEP TURNING - Turning Anti-Clockwise			
(L) Stepping Back	(R) Stepping Back	(L) Stepping Fwd	(R) Stepping Fwd	(L) Stepping Back	(R) Stepping Back	(L) Stepping Fwd	(R) Stepping Fwd
1	8	8		8	1	1	8
9		8		9		9	
17				18			
35							

Sine Wave Movement
(Movimiento Ondulante)



Present by
I.T.F. Technical Committe

APPENDIX 3

APPENDIX 4

Encyclopaedia Vol 8 pg 127 – Chon-Ji Tul, move 3 – Backward Step Turn 180 deg Clockwise