An As-Yet Unnamed, Preliminary Written Notation

for

Martial Arts Techniques

Introduction

This paper began as an effort to create a shorthand notation that would allow a student to rapidly and accurately capture the essentials of a new form after only a few viewings. The motivations were to allow students to take written notes when learning a new form in the style they study, and to allow students to easily document a form from outside their style and bring it back to the school.

It took little more than a week to develop a robust, fairly complete set of symbols and shorthand notation for stances used in the forms. The symbols could be sketched out along the path of the form, with just a few extra notations for direction of rotation, and accurately represent nearly all the forms.

However, the task of developing a shorthand for hand techniques was considerably more intractable. Should the same symbol be used to represent the knife hand blocks in both pyong cho dan and pyong e dan, or should different symbols be used based on the different location of the blocks? If the same symbol was used, then an entirely new notation was needed to describe the location of the blocks. On the other hand, using different symbols would mean an out of control proliferation of symbols for techniques used only once in one form (such as the swan hand of pyong sam dan). And all of this ignored the question of transitions between stances, which range from the simple (moving from one front stance into another) to the complex (such as transitions between back stances in pyong cho dan), to say nothing of general body posture.

Regardless of how hand technique and body motion was described, the question of documenting weapon forms added another layer of complexity. Would a separate set of symbols be required for each weapon? The sheer number of symbols required for a complete shorthand notation was becoming unmanageable.

A survey of techniques for recording human motion (and in particular dance) offered several promising approaches for documenting martial arts, but all of them required giving up the goal of a robust yet simple shorthand notation to completely describe forms and techniques. As a consequence, I shifted my focus from developing a shorthand for rapidly noting down forms to developing a written notation that could describe any form in any style. This paper is the first result of my efforts.

Goals

With very few exceptions, nearly everything that a Tae Kwon Do student will learn must be taught directly by a higher ranking instructor (and exceptions are mostly confined to information rather than technique). There is tremendous value in this approach:

- the instructor serves as a gatekeeper to prevent students from learning techniques for which they are unprepared by way of skill or perhaps more importantly by way of maturity;
- the instructor monitors the students' techniques as the students learn them, and provides immediate corrective feedback;
- the direct transmission of knowledge from teacher to student fosters a sense of communal identity within the school, and can help students see themselves in an unbroken line of students extending back to the founder of a particular martial art.

Despite these benefits, there is a strong argument to be made that the martial arts suffer from a lack of a formal notation for their techniques:

- the student practicing a new technique is dependent upon memory that may be incomplete or in error;

- instructors will often teach the same form or technique in slightly different ways, and with different emphases, over time stylistic differences or actual errors become enshrined as the "right" technique;
- lack of documentation means there is no reference to go to when trying to resolve questions about a technique;
- less used techniques are at risk of being lost.

A notation system for martial arts should meet the following goals:

1. the notation should use a minimal number of symbols;
2. the symbols should be unambiguous;
3. the notation should be capable of describing basic techniques, forms, and step-sparring;
4. the notation should be extendable to weapons techniques;
5. the notation should include a shorthand to allow rapid transcription of techniques, ideally at the speed they are normally performed;
6. the notation should be intuitive and readable by students with a minimal amount of instruction;
7. a reader familiar with the notation should be able to learn a technique from the description of the technique in the notation.

Existing Systems for Recording Human Movement

A quick survey of the Internet as of summer 2012 revealed many discussions about written notations for martial arts techniques, with the general consensus being that no such notation exists and that developing such a notation is not possible (naturally I considered that a challenge). A more general search of the internet for written notations for human movement turned up a number of written notations for dance which could have some application to the martial arts community.

Note: For purposes of brevity in this section and throughout the rest of this paper, the term ***line*** will be used instead of the (mathematically correct) term ***line segment***.

Note: This section is included for reference, to allow readers to see the kernel from which the notation was developed. Readers who find it boring may safely skip ahead to the section labeled Roots of the Notation.

Feuillet Notation

This notation is among the oldest of dance notations. It is named for Raoul-Auger Feuillet, who first published the notation in 1700. The notation continued in use through the first half of the eighteenth century, and still has some use today in certain areas of Baroque dance study.

This notation is also referred to as Beauchamps-Feuillet notation. In the late 17th century, Louis XIV commissioned the development of a notation to record dance. Pierre Beauchamps was dance master to the king until 1687, and developed (but did not publish) a dance notation in the 1680s, and filed a formal complaint in 1704 alleging that he, rather than Feuillet, had developed dance notation. As he had not published his work, Beauchamps failed to establish his claim, but he is still credited with the initial creation of dance notation for Baroque dance, and Feuillet notation is sometime referred to as Beauchamps-Feuillet notation in deference to Beauchamps' claim.

This notation uses a series of lines to show the path followed by dancers in the course of the dance.

Since dancers sometimes trace over their footsteps multiple times, it breaks the complete path of a dance into the separate overlapping pieces, with the pieces connected by a dotted line. A marker at the end of the two pieces shows the common point at which the two should be overlaid.

The path along which the steps are shown also includes a series of marks breaking the path into segments. Each mark on the path corresponds to a single measure of the music to which the dance is performed. In this way, the notation not only shows the motions of the feet, but also the tempo of motion. In Feuillet notation, the starting position of a male dancer is shown by a semi-circle; the starting position of a female dancer is shown by a pair of concentric semi-circles. The flat lines crossing the open end of the semi-circles show the initial facing directions for each dancer. The illustration that follows shows the path followed by a single pair of dancers at the beginning of the Bacchante as choreographed by Pecour.

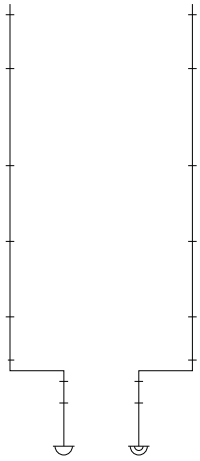


Illustration 1: Feuillet Path Notation

Symbols along the lines showing the path of the dance are used to show foot placement, the steps executed during the dance, and the order in which those steps are taken. As there are different types of steps executed during a dance, there are different symbols representing the steps and stances of the dance. Foot symbols in this notation bear a strong resemblance to written musical notes. A solid circle indicates the heel. A line extends from the heel toward the toes. At the end of this line a second line slants away to the left or right (when looking from the heel to the toes) to indicate which foot is being rendered. Various other short lines may be drawn across the line of the foot, indicating various standard stances the dancer might take.

Illustration 2: Feuillet Notation for a Jeté (Jump)

Finally, a dance can be documented with the accompanying music. The illustration that follows shows

all the elements for the beginning of the Bacchante, as documented by Pecour, including the associated music.

Illustration 3: Feuillet Notation for the Bacchante; Path, Steps, and Music

Stepanov Dance Notation

Stepanov Dance Notation was developed in 1892 and used principally for ballet notation. It represents complex moves by breaking them down into simple motion of single parts of the body. The notation encodes movements as musical notes rather than pictographs or newly invented symbols.

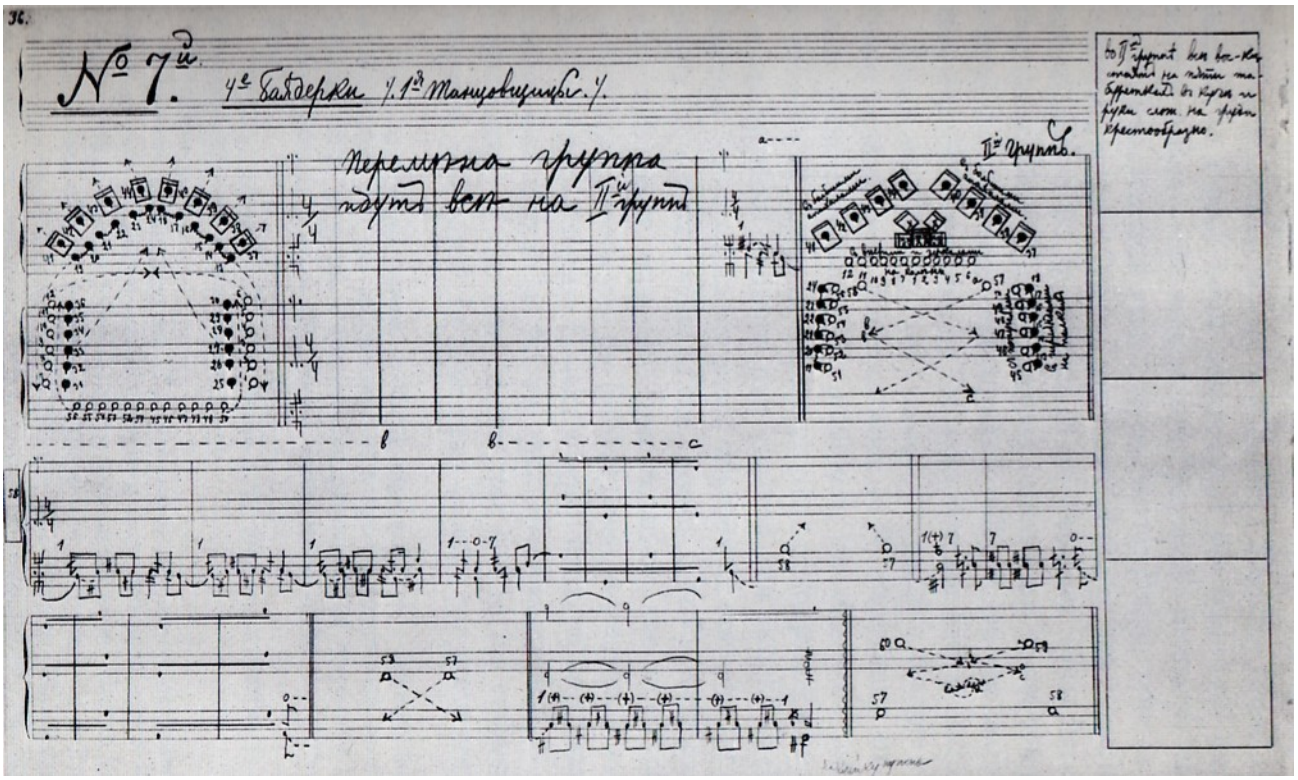


Illustration 4: Stepanov Notation from the Ballet Bayadere Circa 1900

Laban (or Labanotation)

Laban Notation was first published in 1928. It was developed by the Hungarian dancer Rudolf von Laban, initially as a method for documenting dance. It has since evolved into two distinct types of notation: Labanotation and Laban Movement Analysis. The principal difference between these two branches of the notation appears to be the existence of two separate professional bodies regulating their development.

Labanotation is a complex system for documenting human motion, relying on multiple diagrams and an invented set of non-intuitive symbols. Though originally developed for the purpose of documenting dance, the system has been extended to describe human motion generally, and beyond that to disciplines such as robotics. There are a number of professional training programs to certify practitioners of Labanotation, and the training process is lengthy.

The Labanotation diagram of the human body uses a number of symbols to represent portions of the body. These rather non-intuitive symbols are shown in the illustration which follows.

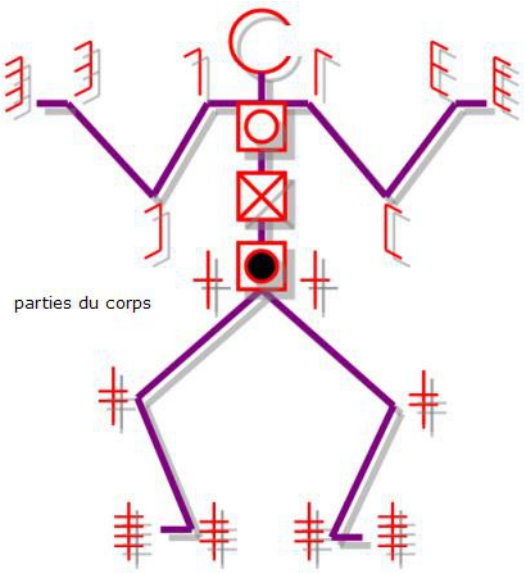


Illustration 5: Labanotation Symbols for Parts of the Body

Labanotation uses a second diagram to show the duration of movement. Time progresses in the diagram from the bottom to the top, while the diagram is read left to right to describe parts of the body. A complex graph is used to show the dynamic quality of movement.

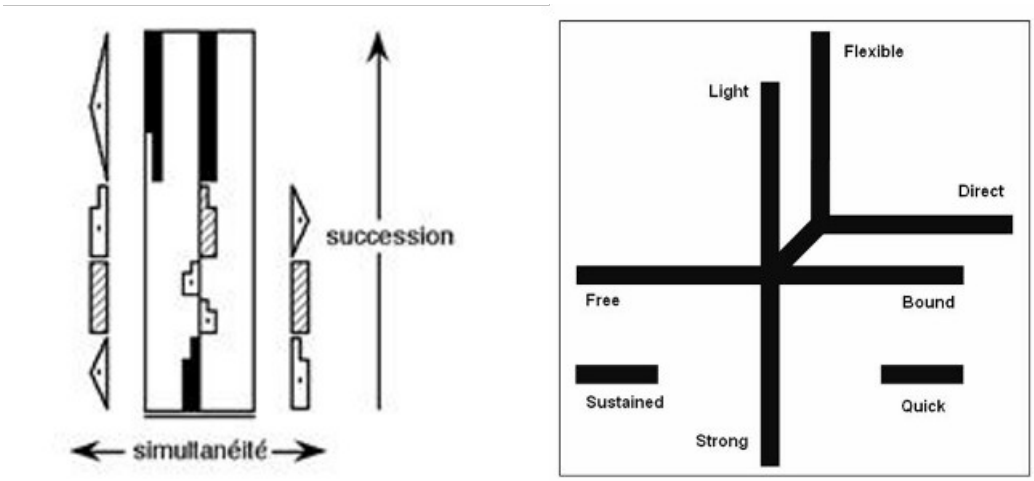


Illustration 6: Labanotation Movement Diagram (Left) and Dynamic Diagram (Right)

About Laban Movement Analysis, wikipedia says:

"*Also known as **Laban/Bartenieff Movement Analysis**, it uses a multidisciplinary approach, incorporating contributions from anatomy, kinesiology, psychology, Labanotation, and many other fields. It is used as a tool by dancers, actors, musicians, athletes, physical and occupational therapists, psychotherapy, peace studies, anthropology, business consulting, leadership development, health & wellness, and is one of the most widely used systems of human movement analysis today.*"

In brief, Laban Movement Analysis appears focused more on what is in the mind of the actor, than on the motions performed by the actor.

Eshkol-Wachman Movement Notation

Eshkol-Wachman movement notation was first published in 1958. Unlike the other systems described here, it was not originally developed to describe dance, or even specifically to describe human movement. The notation depends upon a simple model of the moving body (a stick figure of “limbs” and “joints”), and uses a series of notations to describe how each “limb” moves at each “joint.” The notation is organized in a table, rather than through pictographs or symbols. The system bears a strong resemblance to the techniques used to animate a model in animation software.

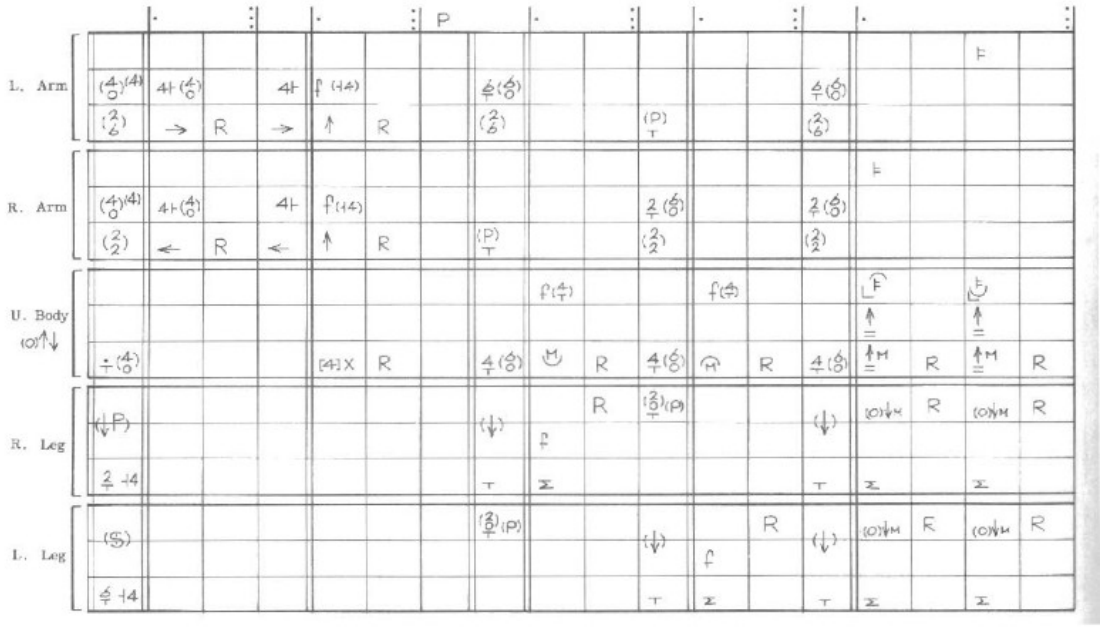


Illustration 7: Sample Eshkol-Wachman Notation

Of all the notations described here, Eshkol-Wachman is certainly the most rigorous. It has been used successfully study infant motions and detect early precursors to autism and Asperger's Syndrome (Proceedings of the National Academy of Sciences of the United States of America, Vol 101, No. 32). It has also been used to document multiple forms in Tàijíquán, including the short form of Zhèng Mànqīng, as well as elements of karate.

The principal shortcomings of Eshkol Wachman notation are its complexity, which makes it difficult to learn and slow as a recording tool; and the non-visual nature of the notation (a user cannot easily visualize the stance or motion described by the notation).

Benesh Movement Notation

Benesh movement notation was developed in the late 1940s to document dance or other forms of human movement. The notation uses abstract symbols representing the human body, on a five-line musical stave representing the head, shoulder, waist, knees, and floor. The notation shares much in common with Sutton Movement Writing, but lacks some of the precision of the Sutton Notation.

Sutton Movement Writing

Sutton Movement Writing is a generalization of a notation (DanceWriting) first developed by Valerie

Sutton in 1966. It uses abstract stick figures to represent the human body, and like Benesh movement notation it uses a five-line musical stave to represent height positions. Special symbols code movement, orientation, and power. The notation has specialized variants called DanceWriting, Mime Writing, Sign Writing (a written notation for American Sign Language as well as the sign languages of other nations) and Sports Writing (skateboarding, gymnastics, ice skating, karate, and yoga). In recent years, most of the focus of Sutton Movement Writing appears to have been on Sign Writing. The current version of the Sign Symbol Sequence (SSS-2004) contains over 27,000 symbols (SSS-2004 is not yet part of the Unicode standard).

The original DanceWriting technique used stick figures on a five line musical staff to represent particular positions or movements in ballet. Sutton developed the notation as a student in 1966 for her personal use. A few years later when training in Copenhagen, she used it to document the historical ballet steps of the Royal Danish Ballet. She published her first textbook in 1973, and in 1974 taught the system to the members of the RDB by invitation.

Illustration 8: Valerie Sutton in a ballet pose, with the corresponding DanceWriting representation

After reading articles about her system and seeing a demonstration, sign language researchers at the University of Copenhagen asked Sutton to develop a version of her notation for sign language. This led to the development of SignWriting, first applied to Danish Sign Language. SignWriting is also used for American Sign Language, and over the last decade the government of Brazil has recommended that it be used to document Lingua Brasileira de Sinais.

SignWriting notation includes both symbols for various static gestures and a notation for showing motion.

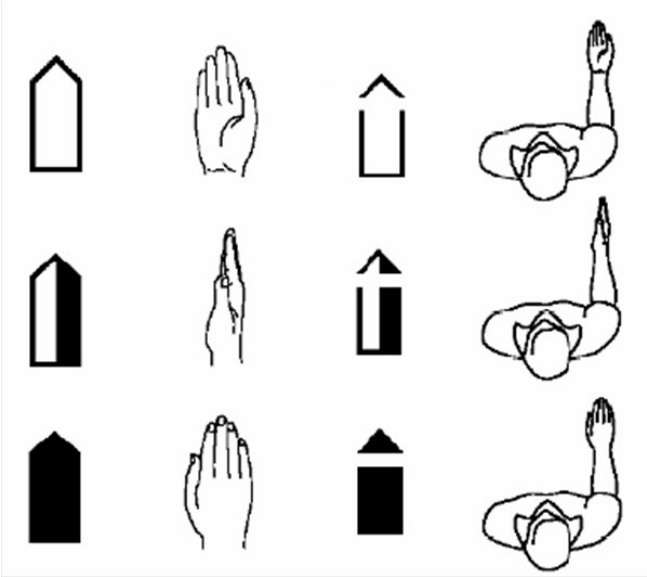


Illustration 9: Symbols for Static Gestures in SignWriting

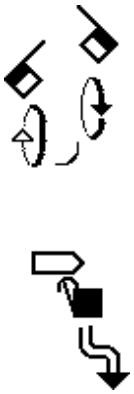


Illustration 10: Showing Motion in SignWriting

Applicability to Martial Arts

These six notations serve as a starting point for developing a written notation for martial arts. Each provides some element or set of elements that could be incorporated into a notation. The Feuillet notation for showing a path of movement (especially when the path overlaps itself) is useful to the description of forms. The technique of diagramming foot placement and movement, and drawing tempo lines on the path of movement, are also extremely valuable.

The Benesh and Sutton schemes of diagramming motion on a musical staff are useful for showing kinesthetics as well as the transitions between static positions. Sutton is somewhat more valuable as it adds notation on power and tempo to the diagram, and its body diagramming techniques are more fully developed than Benesh (which generally just shows locations of shoulders, hands, and feet).

Stepanov notation is of limited value due to its representation of multiple actors and its use of musical notes to indicate motion. Representing multiple actors could be useful if the intent was to choreograph a large martial arts brawl (as for example in filming a movie); but the complexity of the notation and the use of non-intuitive musical symbols to represent actors make this a poor choice for general use.

The Labanotation and Eshkol-Wachman notations could easily be used to document martial arts techniques without modification; Eshkol-Wachman in particular has already been used to document karate and the Tàijíquán short form of Zhèng Mànqīng, and probably would be the most valuable for a precise notation of martial arts. However, the complexity of both these notations make them impractical for a general-use notation.

Roots of the Notation

The notation developed in the following chapters is based on Feuillet Notation and Sutton DanceWriting. The path notation from Feuillet notation is used with almost no change in the martial arts notation. I have also adopted the idea of stance notation from Feuillet notation, but have created a new set of stance symbols specific to martial arts. The short lines breaking a path up based on tempo are also part of the notation. This part of the notation is referred to as the Path Diagrams.

From Sutton DanceWriting I am borrowing the idea of stick figures to represent the position and orientation of parts of the body in space. In addition, I retain the use of measures to indicate temp. Each measure corresponds to one interval on a path diagram (that is, the short tempo lines that break up the path based on tempo correspond to the lines separating measures on the DanceWriting-like diagrams). Many of the refinements of DanceWriting (such as using stick figure line weight and special depth markers below the music staff to represent relative position of arms and legs, and the use of most dynamic markings) are omitted from this version of the notation. However, the stance symbols that are used on the path diagrams are also used on these diagrams, in place of the depth markers that show foot position in DanceWriting. Two special symbols are used on these diagrams to indicate ***kiyops*** and ***sanchans***. This part of the notation is referred to as the Kinesthetic Diagrams.

Assessment of the Notation

After completing the notation and documenting the nine colored belt forms, it is possible to look back at the goals for the notation and assess how successful the notation is at meeting those goals.

The notation should use a minimal number of symbols. The current notation uses 18 symbols for hand techniques (with three options for shading each symbol to show orientation of the hand), ten symbols for stances (with some symbols also having a mirror image), and two additional symbols to show sanchans and kiyops; for a total of 30 symbols. A few additional conventions show rotation of facing and division of the form into components.

The symbols should be unambiguous. This is largely true of the hand technique symbols, which are silhouettes of the actual hand. This is less true of the foot symbols, which evolved from the shorthand developed to support the original goal of this paper (rapidly documenting new forms). After documenting the nine colored belt forms, it is apparent that the notation could benefit from additional symbols for kicks as the stick figure diagrams are at times ambiguous or confusing.

The notation should be capable of describing basic techniques, forms, and step-sparring. The third chapter of this paper shows that the notation can effectively document the colored belt forms. The forth chapter presents examples extending the notation, but the notation could benefit from “contact symbols” used in DanceWriting (such as brush, strike, grasp). Only the grasp symbol was carried over into this notation. The notation could benefit from using line weight to show depth in the stick figures (see illustration 8); this was not done here because the tools used for creating the diagrams did not easily support changing the line weight in the stick figures. The notation does not support Hapkido as it lacks sufficient detail regarding holds and has no notation for pressure points.

The notation should be extendable to weapons techniques. The forth chapter shows an extension of

the notation to Bo 1, probably the easiest form to describe with the notation. Extension beyond this requires several issues to be addressed. Each weapon has its own unique “flair” move (for example the sai, escrima, kama, and bo all have special spin techniques). There are particular grips for each weapon that must be diagrammed with new symbols. For some weapons (especially the sword) there is a motion of the tips of the weapon which must be traced out in addition to the motion of the human body. Thus, each weapon will require special additions to the notation, and for the sword an additional convention must be adopted to describe the motion of the blade.

The notation should include a shorthand to allow rapid transcription of techniques, ideally at the speed they are normally performed. On the whole, this goal was not achieved. A shorthand notation was developed for foot techniques, which could be combined with Feuillet Notation to provide a sort of shorthand for the path diagrams. A hand technique shorthand is more problematic (but still probably achievable as there are a limited number of hand techniques to describe). The idea of a shorthand falls apart with the kinesthetic diagrams, as there are in principle any number of different body positions and transitions that might appear in a form. The full notation fails to meet this goal (rapid transcription); diagramming Passai took hours with available tools.

The notation should be intuitive and readable by students with a minimal amount of instruction. This will have to be assessed over time.

A reader familiar with the notation should be able to learn a technique from the description of the technique in the notation. This is certainly achieved with the first three forms, but becomes less true beginning with Pyong Cho Dan, which includes near the end back stance transitions in which the hips and stance rotate in one direction about a vertical axis through the body, while the torso and head rotate in the opposite direction about the same axis. This becomes increasingly true in later forms. This could be addressed by adding rotation symbols about the vertical axis (these were omitted from this version of the notation as they seemed to clutter the early diagrams without adding any value).

Recommended Changes

Based on the assessment above, several changes could be made to improve the notation. Line weights could be used to clarify depth in the kinesthetic diagram stick figures. A marker can be added to the shoulder lines to show facing of the head (as done in DanceWriting). Symbols can be added for kicks to eliminate the ambiguity about what is happening with leg motions in many of the kinesthetic diagrams. The contact symbols used in DanceWriting can be added to clarify what kind of contact is intended at different points in the form. Finally, rotation symbols can be added to the kinesthetic diagrams to clarify rotation, especially when different parts of the body are moving in opposite directions.

The Basics

There are two basic sets of symbols used in the notation. A set of hand silhouettes show the position and orientation of the hand during a form. A separate set of symbols is used to show the position and orientation of feet in stances during a form.

Hand Symbols

Each of the basic hand positions is represented by a symbol that approximates the silhouette appearance of the hand (see the table of the following page). These silhouettes are further modified to show orientation of the hand by the use of shading. An open silhouette indicates that the hand is oriented horizontally palm-up, or with the palm facing inward (toward the face or torso). A filled silhouette indicates that the hand is oriented horizontally palm-down, or with the palm facing out (away from the face or torso). A half-filled silhouette indicates that the hand is oriented palm-vertical, generally with the thumb edge up. The open edge of the silhouette shows the thumb edge, allowing the hand to be drawn with the thumb edge oriented down, if necessary.

Some of these symbols resemble symbols used in SignWriting, and there are a number of symbols used in SignWriting that could represent the same hand positions described in this notation. However, the manner in which thumb and fingers are indicated on the standard SignWriting symbols could lead to confusion or error in the notation. Consider the diagrams for the fist with the fore-knuckle extended, mid-knuckle extended, and both knuckles extended. The small loops showing the particular knuckles raised (or extended, if the signs were to be used to represent fists) could easily become confused, especially in a hand-written diagram.

Illustration 11: SignWriting Symbols for Index Raised Knuckle, Middle Raised Knuckle, Index Middle Raised Knuckle

Because of the potential for confusion, completely new symbols were developed for this notation that are simple silhouettes of the hand, with minimal opportunity for confusing one symbols with another. In the kinesthetic diagrams, these symbols are placed at the end of the arms showing the proper hand position (a detailed explanation of the kinesthetic diagrams appears later).

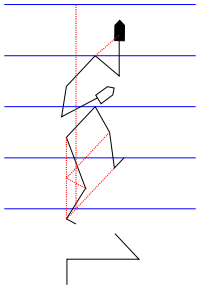


Illustration 12: Back Stance, Knife Hand Block

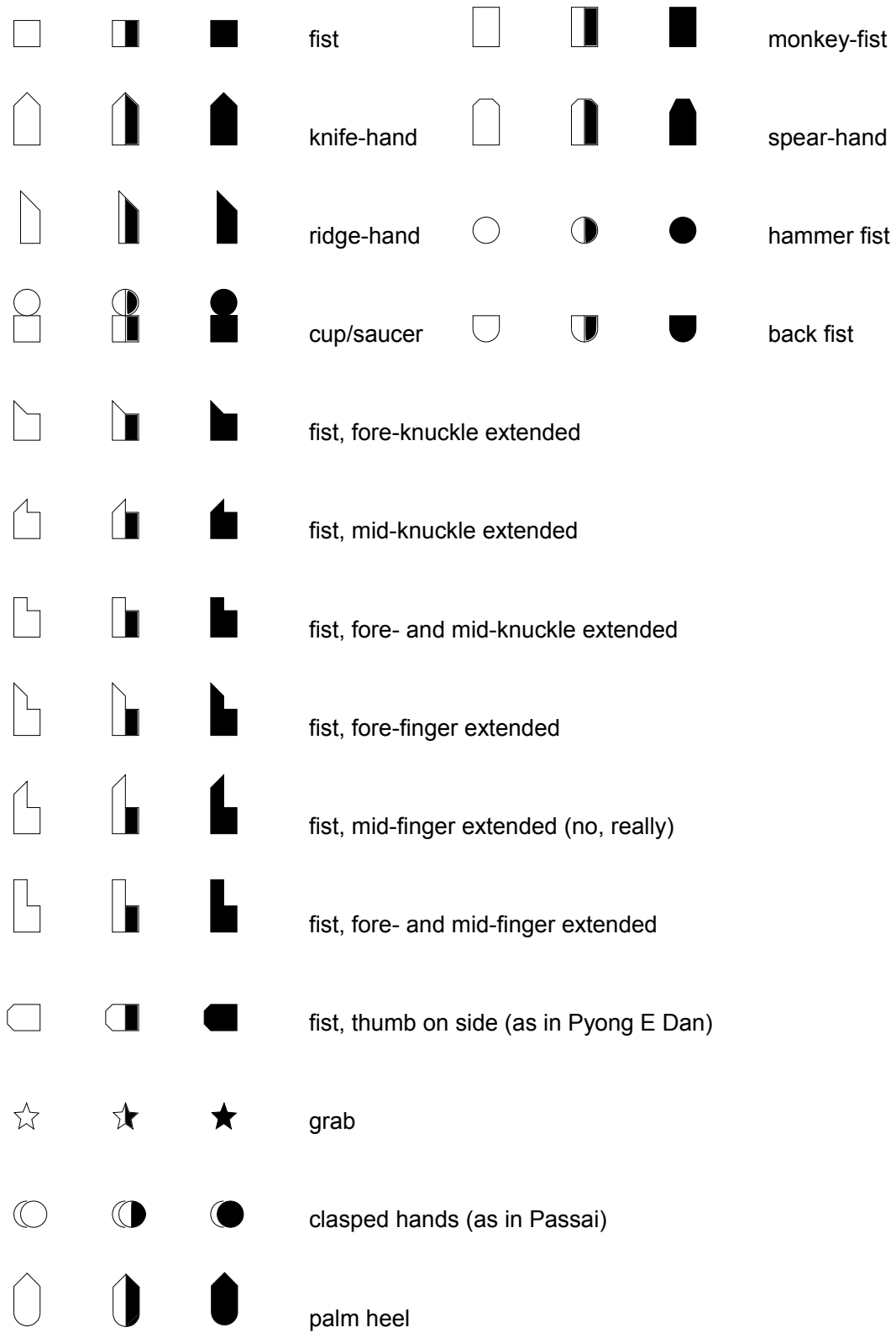


Illustration 13: Hand Symbols

Stance Symbols

Stance symbols, as the name suggests, are used to document stances through the form. Nearly all stance symbols are based upon two lines representing the feet, each headed with half an arrow. The half arrowhead is drawn to represent the toes of the foot. The symbols for the stances are selected to be as nearly intuitive as possible once the interpretation of the arrowheads is understood. In general, the leading arrowhead on a symbol shows the facing direction for the stance; however, several of the symbols need special or extra explanation.

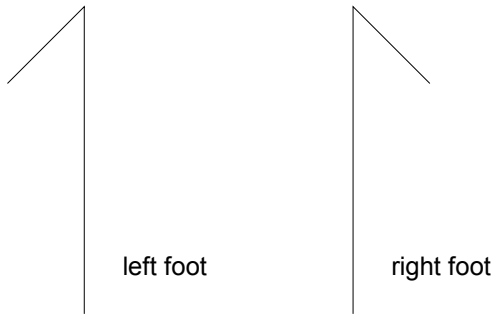


Illustration 14: Basic Foot Symbols

The ***horse stance*** symbol is a baseline with a triangle drawn at its center. The baseline represents the line on which the feet are placed. The base of the triangle rests on the line; the apex of the triangle points in the facing direction.

The ***choon bee*** symbol is a baseline with a short line drawn at its center. The baseline represents the line on which the feet are placed. The short line indicates the facing direction.

The ***heels together*** symbol has no indicator for toes, principally to avoid confusion with the ***back stance*** symbol. [The back stance symbol uses a long line segment for the leading foot, and a very short segment for the rear foot, while the heels together symbol uses equal length symbols for both feet. This is sufficient to distinguish the two symbols in computer-generated documentation, but in hand-written notes the symbols are so similar that confusion may arise if both use toe indicators.] Facing in the heels together stance might be in the direction the left foot is pointing, in the direction the right foot is pointing, or somewhere in between. Where facing is important, a toe indicator is used on this symbol, but care must be used in hand-written notes to distinguish between this symbol and the back stance symbol.

The ***fighting stance*** symbols resemble the back stance symbol. However, the short segment for the rear foot is drawn slightly forward of the end of the symbol, to avoid ambiguity about what the facing direction is for the stance.

The ***grapevine*** and ***cat*** stances are very similar. In both stances, one foot is crossed behind the other. However, in the grapevine stance the heels of both feet remain on the ground (as in the turn executed near the end of Pyong O Dan or the steps taken in the course of the bridge forms). In the cat stance, the heel of the rear foot is lifted from the ground (hence only the “toes” are drawn for that foot). In the cat stance, the front leg may also be bent with the weight of the back leg resting on it, but this will be indicated in the kinesthetic diagrams rather than through the stance notation.

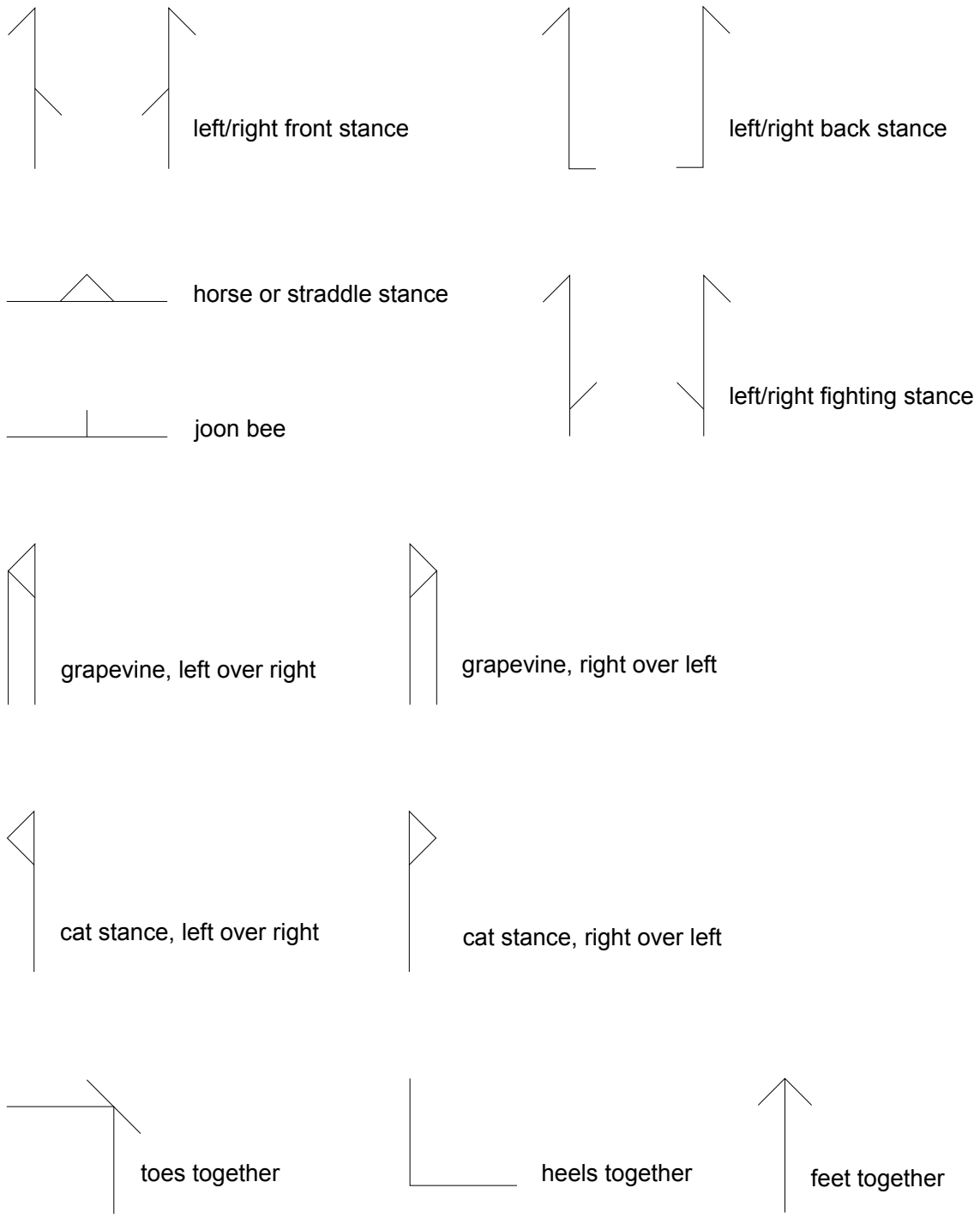


Illustration 15: Stance Symbols

Path Diagrams

Path diagrams trace out the route followed by an actor when executing a form, but to that basic information they add information about stance, pacing, pivot points, facing, and turn direction.
The smallest basic unit of information on a path diagram is a ***measure***. A basic measure will consist of a heavy weight black line (generally one inch long in the diagrams in this paper), terminated at each end by perpendicular lighter weight short (half inch) red lines. Each of the terminating lines will be numbered (also in red). Next to the longer line will be one of the stance symbols in blue (above/below or to one side, depending upon orientation).

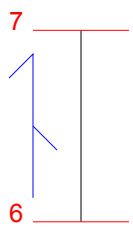


Illustration 16: A Single Measure from a Path Diagram

The sample measure shown above represents a step forward into a front stance, with the left foot leading. The heavy black line represents the path of motion, and the red lines represent the placement of the front and rear feet. The lines are numbered 6 and 7; these numbers represent consecutive measures in the form. In the earlier forms such as Ech Chan Cho Bu and Ech Chan E Bu, these measure numbers correspond directly to the step number in the form, but in later forms they may not.

In many cases, a motion in a form is not a simple step, but a pivot around one foot, or a motion in which one foot is lifted and then replaced on the ground while the other is unmoved. The simplest case of this type of motion occurs near the beginning of Ech Chan Cho Bu. After stepping forward into a right front stance/low punch, the actor must slide the right foot back and across behind the left foot, pivoting around the left foot in a 180 degree counter clockwise turn into a right front stance. The measures for this motion appear below.

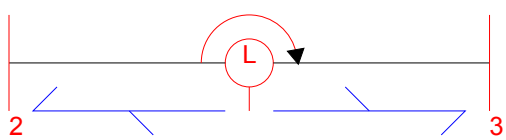


Illustration 17: Ech Chan Cho Bu - 180 Degree Pivot About Left Foot

In this diagram, a 180 degree pivot counter-clockwise about the left foot is shown. The actor begins and ends in a right front stance. The right foot begins at the position shown by 2 in the diagram, and ends at the position shown by 3. The left foot does not move, as shown by the circle containing the letter L. This example exposes a potential flaw in the path diagram. In turning and stepping forward into the right front stance in measure three, the actor is retracing a path from earlier in the form. Some way is needed to show the path that is being retraced without creating a confusing clutter of labels and stance symbols stacked one atop another. This is done by using the Feuillet practice of drawing overlapping portions of a path as separate paths, connected by dotted lines showing how the paths overlap. The

beginning of Ech Chan Cho Bu is then rendered as follows.

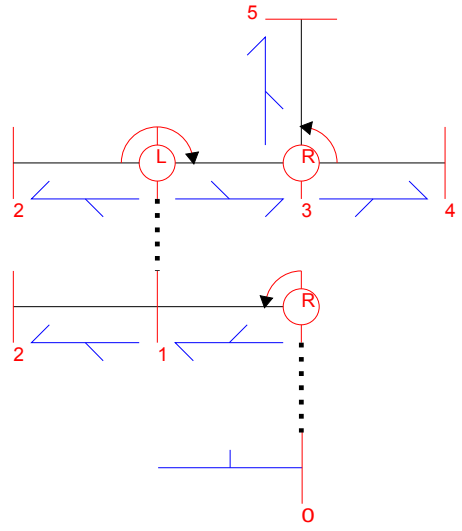


Illustration 18: First Five Measures of Ech Chan Cho Bu

In this illustration, nearly all the elements of a path diagram are present. The actor begins at choon bee, at the position shown as measure 0. The bar for measure 0 is connected to a right foot pivot symbol by a medium weight dotted line. This dotted line means that the two paths in the diagram overlap, and the points connected by the dotted line are really the same single point on the path. In the same way, the bar for measure 1 is connected by a medium weight dotted line to a left foot pivot symbol. The diagram could use connectors between the measure bars marked 2 instead, but as a convention I have chosen to connect the fragments of path diagrams at the pivot points.

In some forms, the actor will step forward into a stance and then execute a series of hand techniques. This happens for example early in Pyong E Dan, in which the actor steps into a back stance while executing a double forearm block (high and medium), then executes a grab and short punch without changing stance.

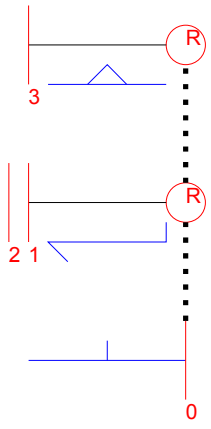


Illustration 19: Early Moves in Pyong E Dan, Showing a Stance Spanning Two Measures

From a pacing perspective, those moves are executed over a period of two counts (one count for the double block, one count for the grab-and-short-punch). To represent this on the path diagram, and keep the path diagram measure bars consistent with the kinesthetic diagram measure bars, two or more

measure bars may occasionally be stacked next to each other on the path diagram. This indicates the number of counts for which the stance is held.

In some forms, it is necessary to indicate a jump of some form. When this is necessary, an arc is used on the path diagram to indicate the jump.

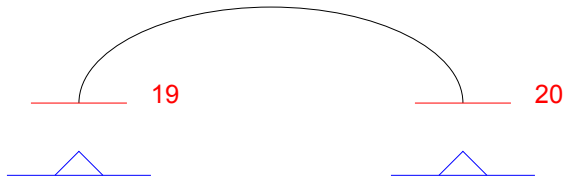


Illustration 20: A Jump at the End of Pyong Sam Dan

Motion of Feet

An earlier version of the path diagrams included notations for movement of feet during the transition between stances. This introduced a significant amount of clutter to the diagrams without adding value for most transitions (see Illustration 3 which includes notation for movement of feet during transitions in Feuillet notation; this shows the clutter that can result).

There are three cases where the arc showing rotation around a pivot point may lead to confusion about the proper motion of feet. In all cases, the arc is intended to show the rotation of facing; feet will follow a different path. For clarity, these transitions are shown here with the notation for foot movement included. Whenever these transitions occur in the path diagrams, it is understood that the feet always move as shown here.

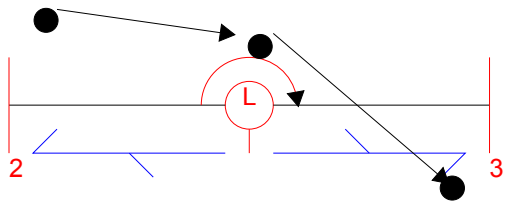


Illustration 21: Motion of Right Foot in a 180 Degree Turn

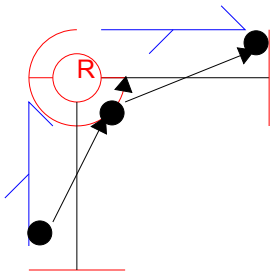


Illustration 22: Motion of Left Foot in a 270 Degree Turn

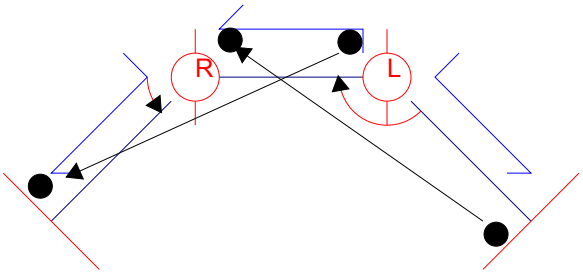


Illustration 23: Motion of Feet in 45/135 Degree Back Stance Transitions

The back stance transitions deserve special attention. When the actor's facing rotates through 135 degrees, the lead foot of the (starting) back stance will follow the path of rotation. However, when the actor's facing rotates by 45 degrees, the back foot of the (starting) back stance moves instead. It does not follow the arc of rotation, but instead slides forward into position.

Kinesthetic Diagrams

Kinesthetic Diagrams can most simply be described as stick-figures-plus. These diagrams provide static information: the position at fixed moments throughout the form (what is normally thought of as “the next move;” and dynamic information: the motion of the body in transition from one static position to the next.

The static information captured is the body position throughout the form. The path diagrams show the motion across the floor and the stances at various points in the form, but contain no information about arm placement or hand techniques. The kinesthetic diagrams provide this information through the stick figure representations of the actor; at the end of each measure the stick figure shows a position which is typically thought of as the “next move” when teaching a form.

The kinesthetic diagrams also provide guidance on how to flow from one static position in the form to another. Some transitions are relatively simple, such as stepping forward from one front stance/middle punch to another. But some transitions (such as the knife hand blocks in Pyong Cho Dan and Pyong E Dan) involve complex or non-intuitive movements. The kinesthetic diagrams are an attempt to provide visual guidance for these transitions.

The kinesthetic diagrams also provide dynamic guidance for a form, including pacing for each

movement, the locations of kiyops, and the locations of sanchens. The notation also supports marking high and low points for forms executed using the sine wave technique.

Kinesthetic diagrams are drawn using a five bar staff, as in musical notation. From bottom to to, the five lines correspond to normal standing positions for feet, knees, hips, shoulders, and top of the head. A light blue-green color was chosen for the staff to prevent it from overwhelming the actual diagrams. For each stick figure (hereafter called the ***body***) drawn on the diagram, a dotted red reference line is drawn from the top to the bottom of the staff. This is the principal reference line or centerline. The centerline will usually (but not always) pass through the "center" of the body. Other reference lines may connect parts of the body to this reference line, providing some guidance on how deep a stance should be at a particular point in a form. Some reference lines may instead connect one part of the body to another (such as a fist to a knee in a down block) indicating placement with respect to another part of the body rather than with respect to the centerline.

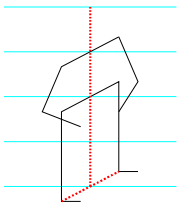


Illustration 24: Choon Bee; A Reference Line Connects Heels to the Centerline

The following diagram illustrates a down block in right front stance. Reference lines for the feet show them to either side of the centerline, with the right foot forward of the centerline and the left foot behind the centerline. The right (blocking) fist is connected to the right knee by a reference line, indicating that the right fist is placed near the knee. A reference line connects the left fist to the centerline. Hips and shoulders cross the centerline directly. The placement of hips, shoulders, and left fist indicate a deep front stance, with the body lowered as much as 8 to 10 inches.

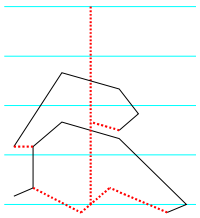


Illustration 25: Down Block in a Deep Right Front Stance

The kinesthetic diagram is divided into a series of measures by vertical blue lines. These lines correspond approximately to individual moves in the form, but really represent pacing of the form. Each measure shows a move or a sequence of moves, and each measure should be executed in approximately the same amount of time as every other measure. A number appears in red above each blue line marking off a measure. These numbers correspond to the red numbers appearing on the path diagrams, and are used to match the path diagrams to the kinesthetic diagrams.

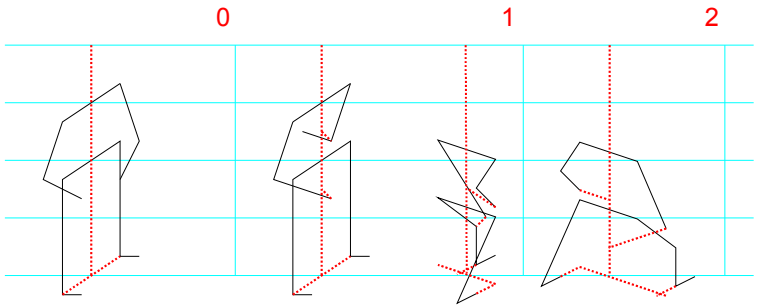


Illustration 26: Two Measures of Ech Chan Cho Bu

Feet will generally be connected to the centerline by reference lines. When they are not, it indicates the foot is in motion (the figure is an intermediate state between static points in the form), either sweeping across the floor or occasionally in air (as in a jump).

Kiyops in a form are indicated by a red exclamation point above the staff. A sanchan is indicated by a red musical hold sign above the staff, over the motion that is executed as a sanchan. If a form being documented is executed using the sine wave technique, the symbols ∧ and ∨ indicate the high and low points of motion respectively (there are no examples of this use in this paper).

The hand symbols shown earlier are used at the end of each arm to indicate the hand technique in use. An open symbols indicates the hand is held palm up or with the palm facing the body. A filled symbol indicates the hand is held palm down or with the palm facing away from the body. A half-filled symbol indicated the hand is aligned with the thumb edge up. The cup and saucer symbol, as a compound symbol, may have its two parts filled in different ways, indicating the orientation of each hand.

The end of a form is indicted by a double bar at the end of the last measure of the form.

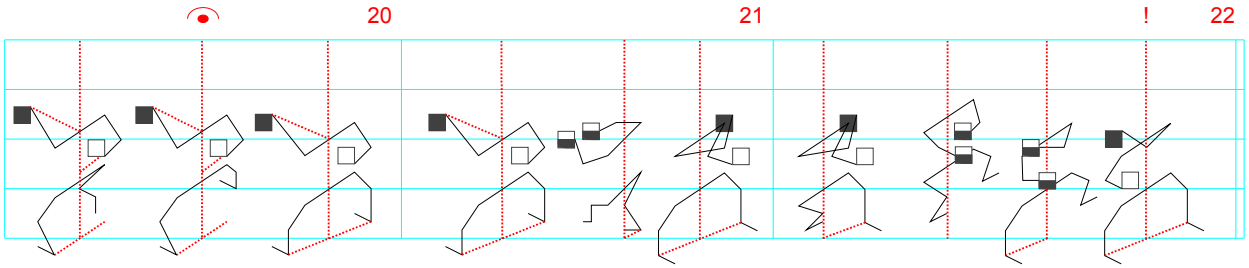


Illustration 27: The End of Pyong Sam Dan, showing hand techniques, a sanchan (measure 20), a lifted foot (measure 21), a kiyop and a jump (measure 22)

The final elements added to the kinesthetic diagrams are stance and “stage” notations under each staff. The stage element is loosely based on stage directions used in DanceWriting. Below the beginning of each measure a small square appears. A line radiates out from the center of the square, indicating the direction of motion for the measure. As a convention, the top of the square represents the direction faced at choon bee before beginning a form. The stance notation appears immediately after the stage notation. Unlike the path diagrams, the stance notation on the kinesthetic diagrams does not indicate facing; the stances are documented simply for clarity.

The Forms

In this chapter I present the forms that make up the Mountain Academy curriculum from 9th kyp white belt through 1st kyp red belt. Each form is documented on two or more pages. The first page contains the Path Diagram representing the path followed by the student. The subsequent pages contain the Kinesthetic Diagrams representing body movement, hand and foot technique, and tempo and power.

The first two forms, Ech Chan Cho Bu and Ech Chan E Bu, share a common path diagram.

Ech Chan Cho Bu/Ech Chan E Bu

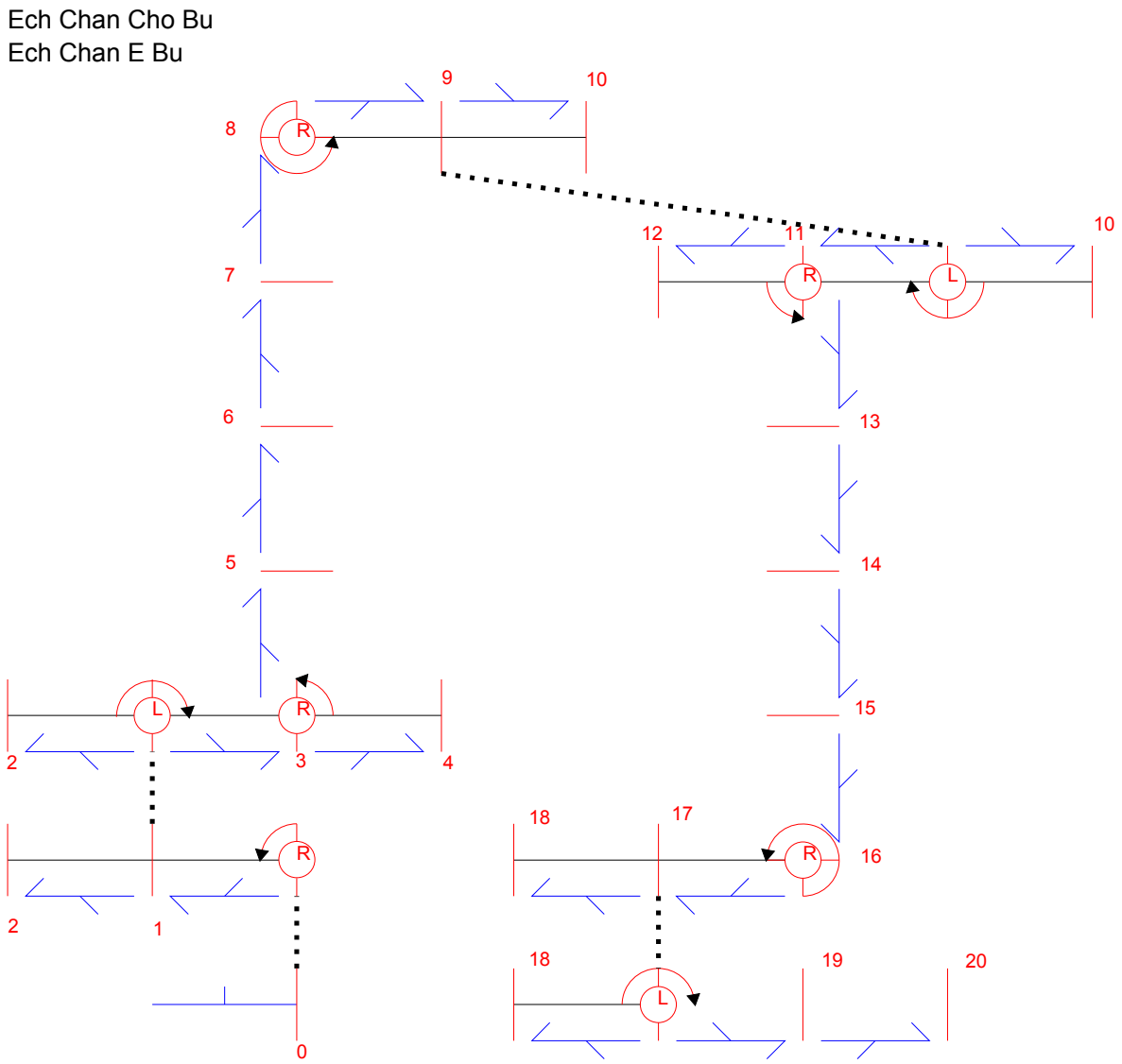


Illustration 28: Ech Chan Cho/E Bu Path Diagram

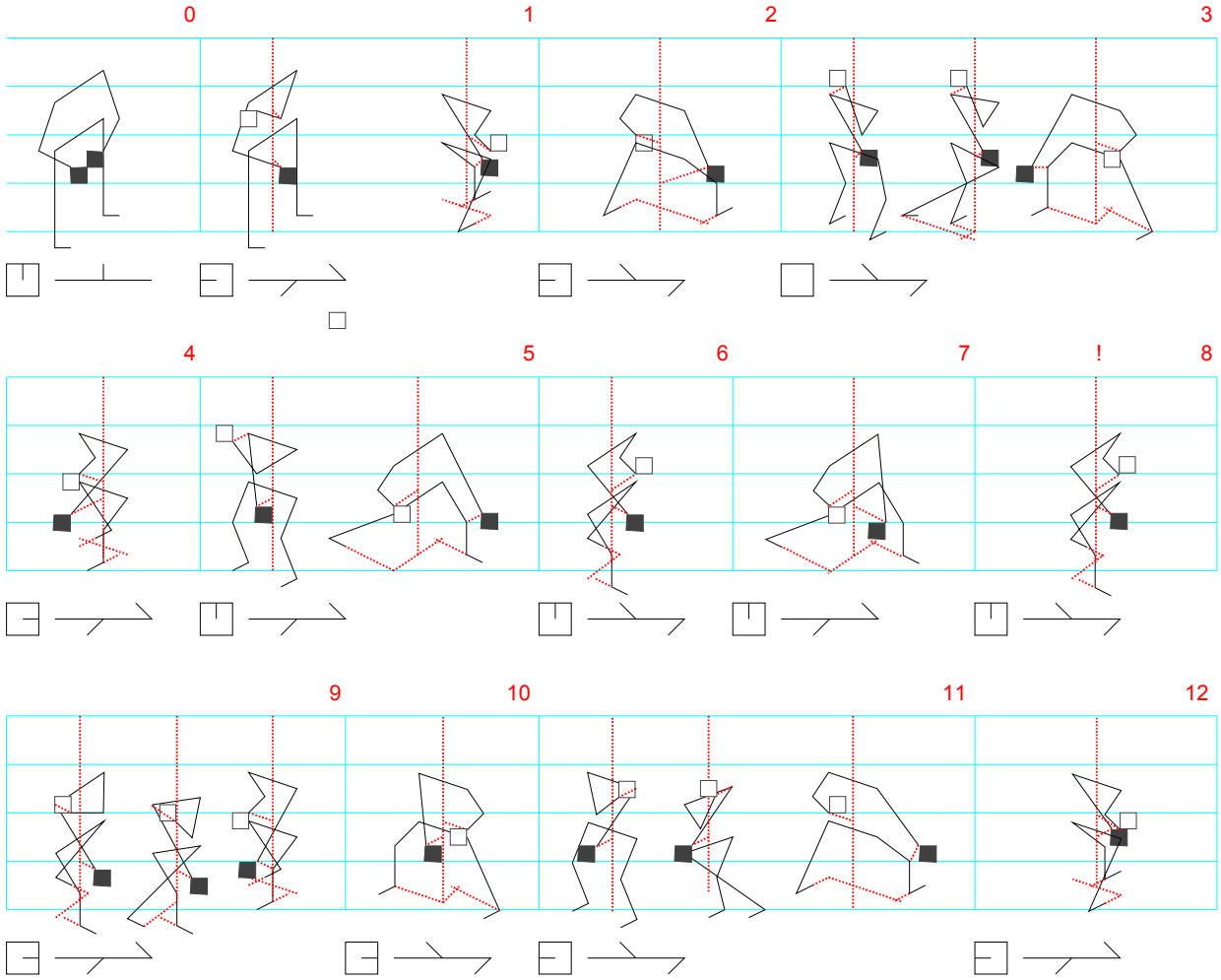


Illustration 29: Ech Chan Cho Bu

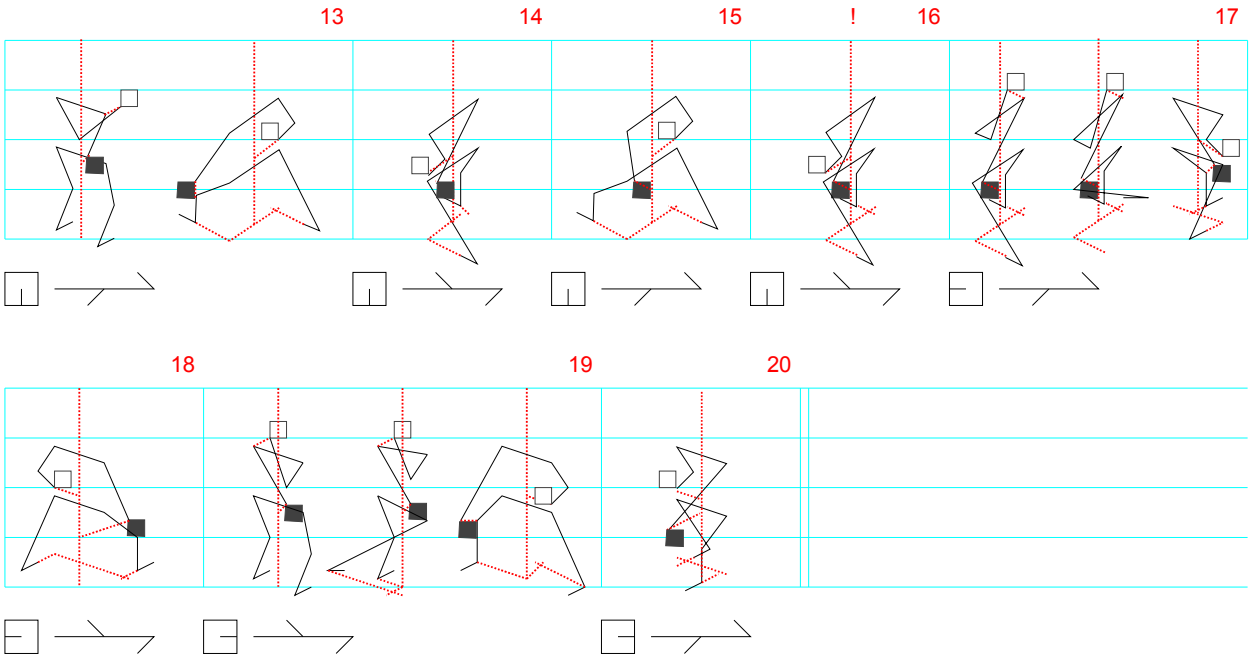


Illustration 30: Ech Chan Cho Bu (continued)

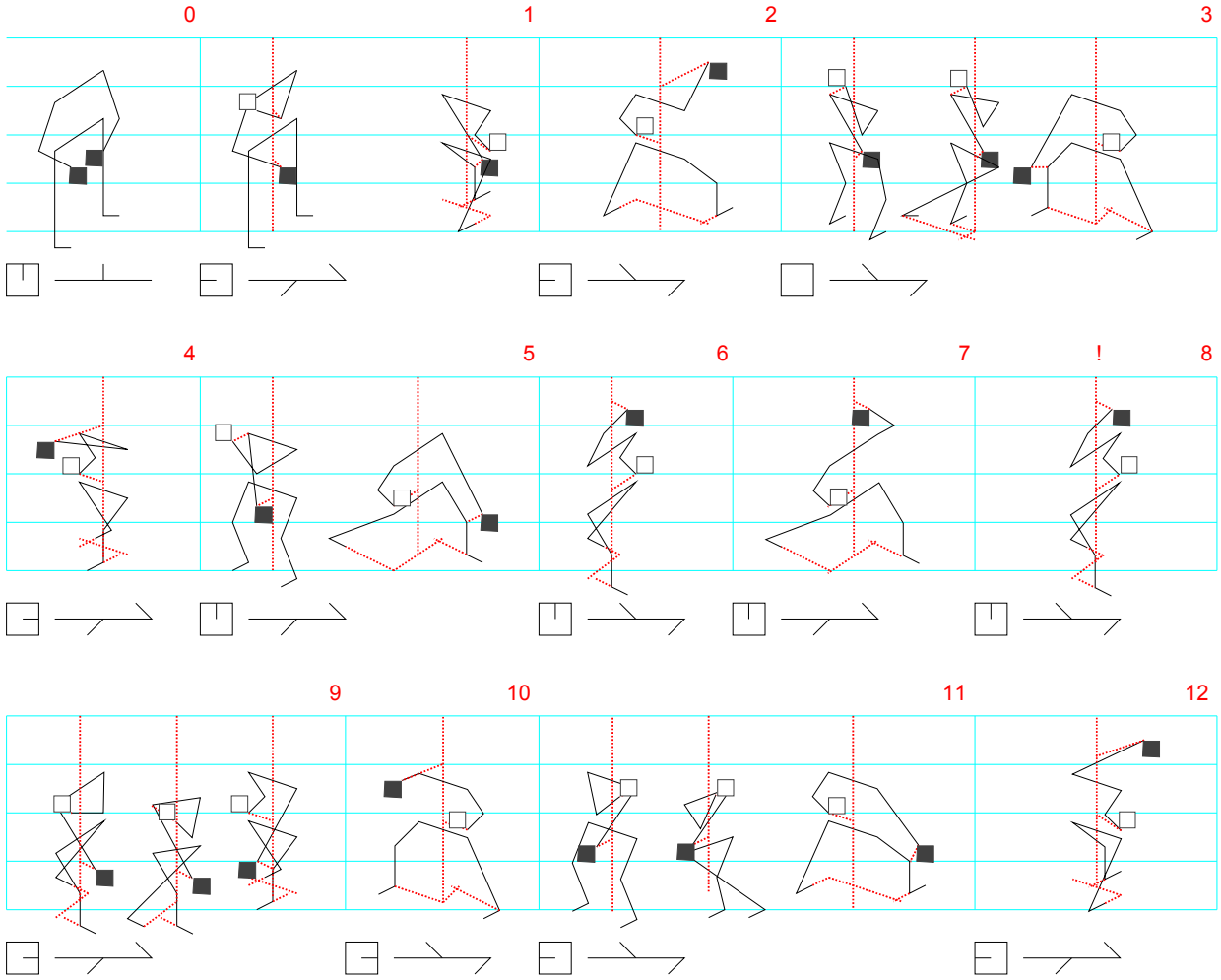


Illustration 31: Ech Chan E Bu

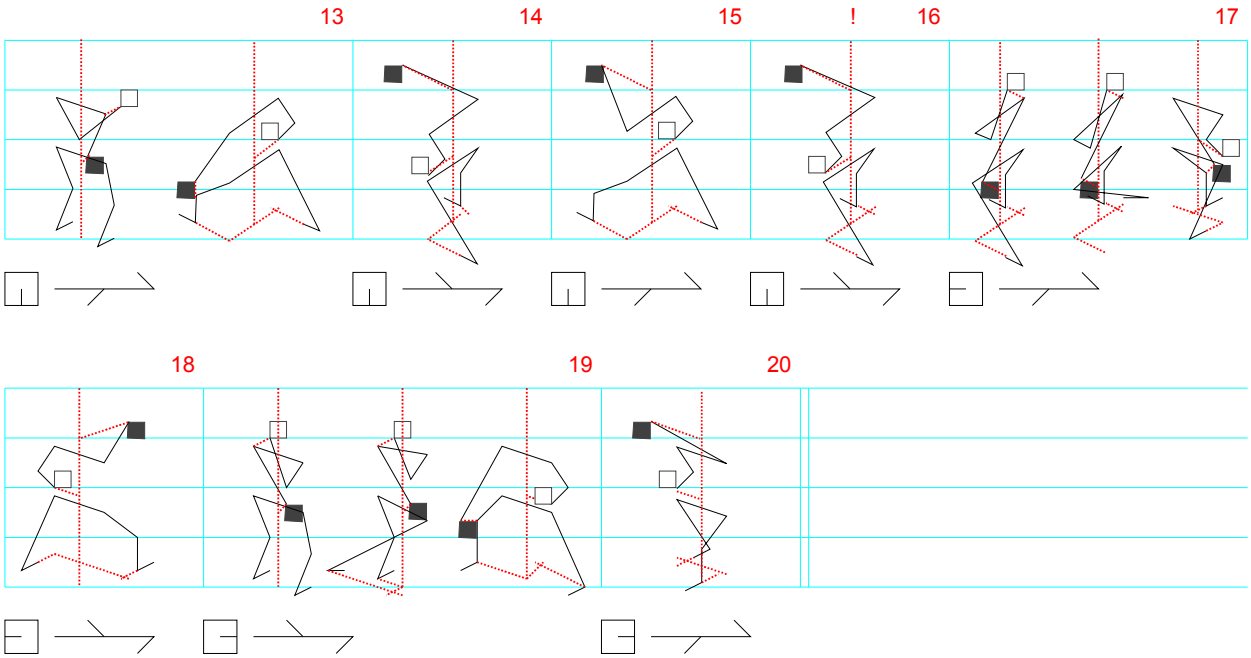


Illustration 32: Ech Chan E Bu (continued)

Ech Chan Shim Bu

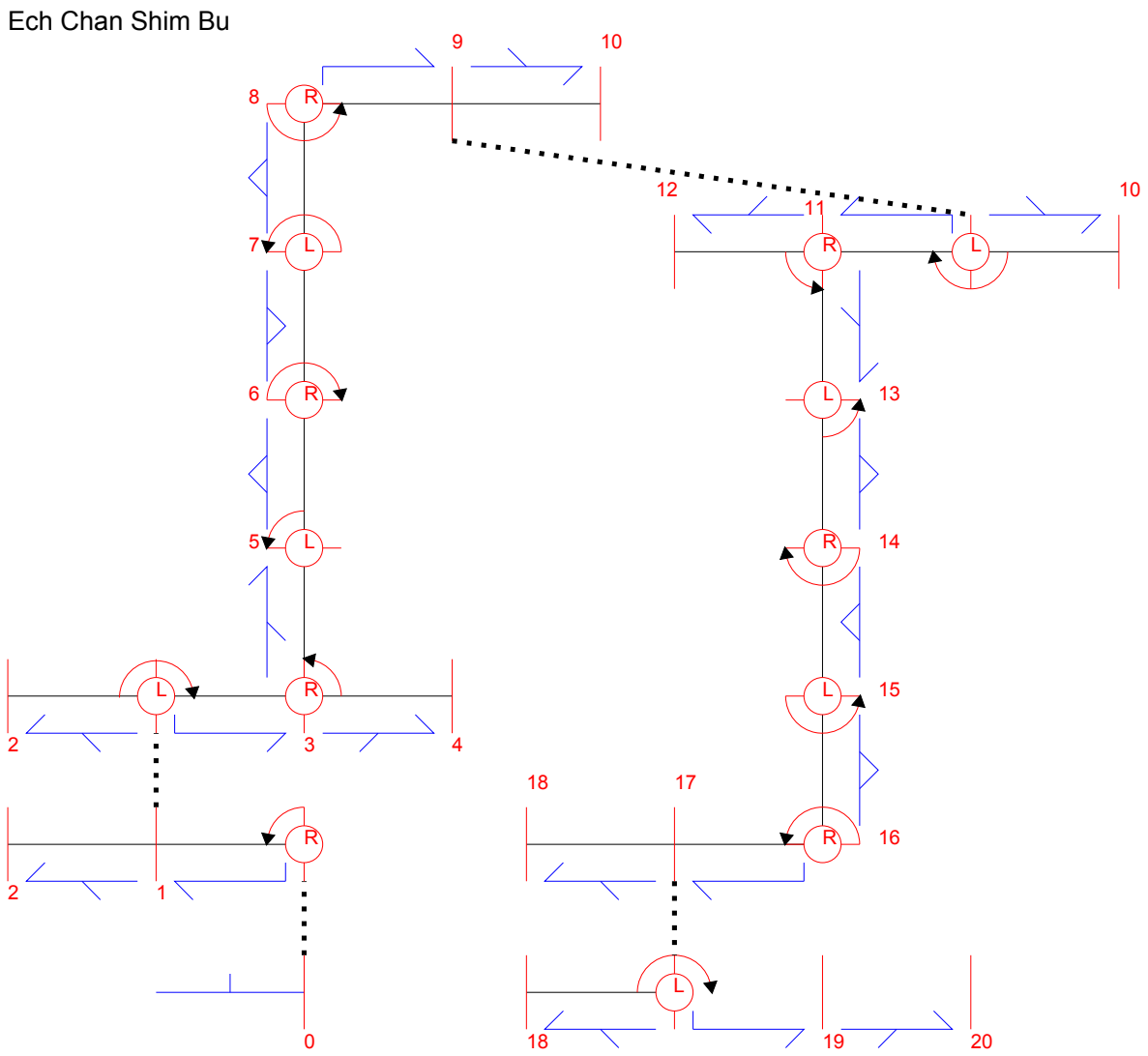


Illustration 33: Ech Chan Shim Bu Path Diagram

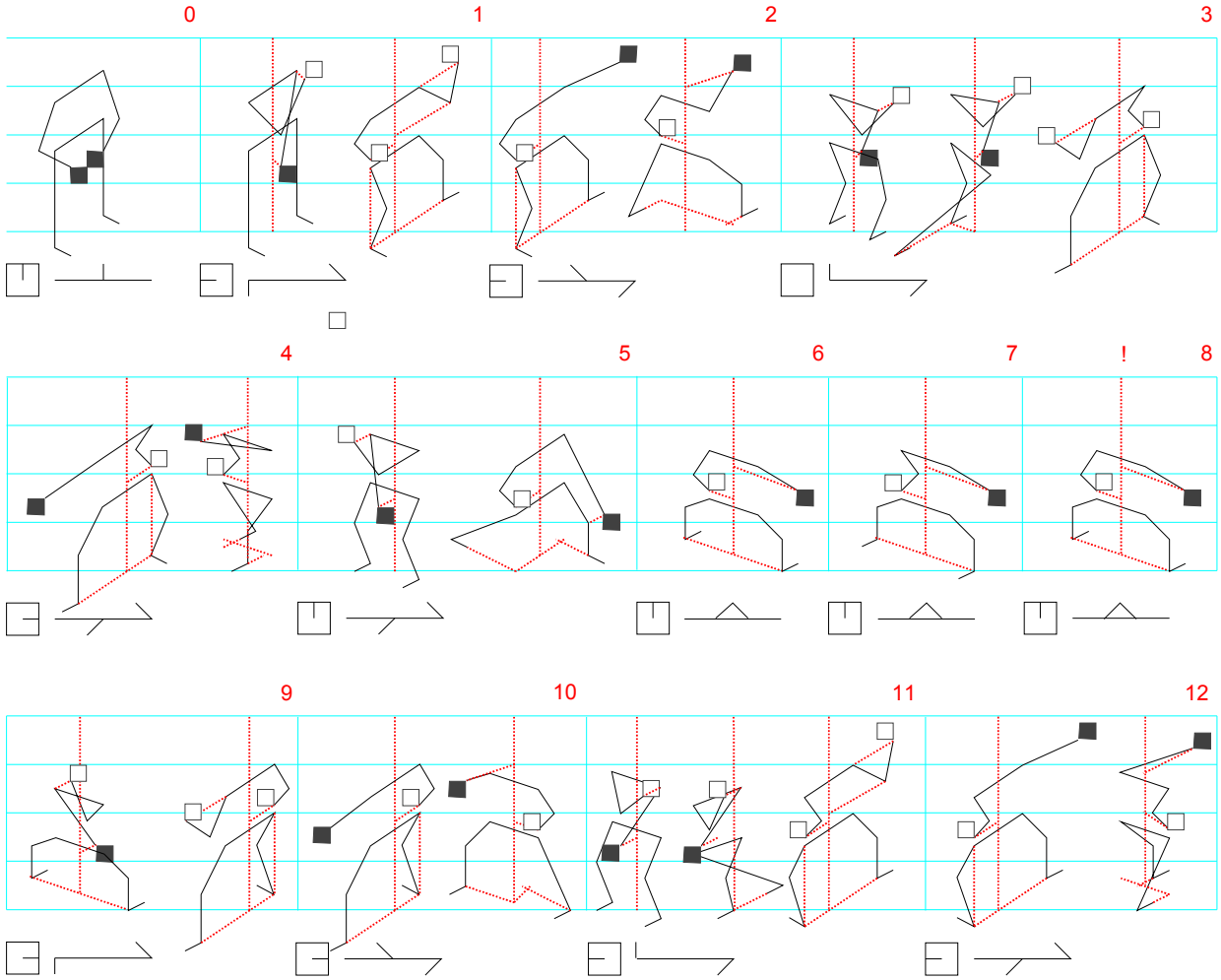


Illustration 34: Ech Chan Shim Bu

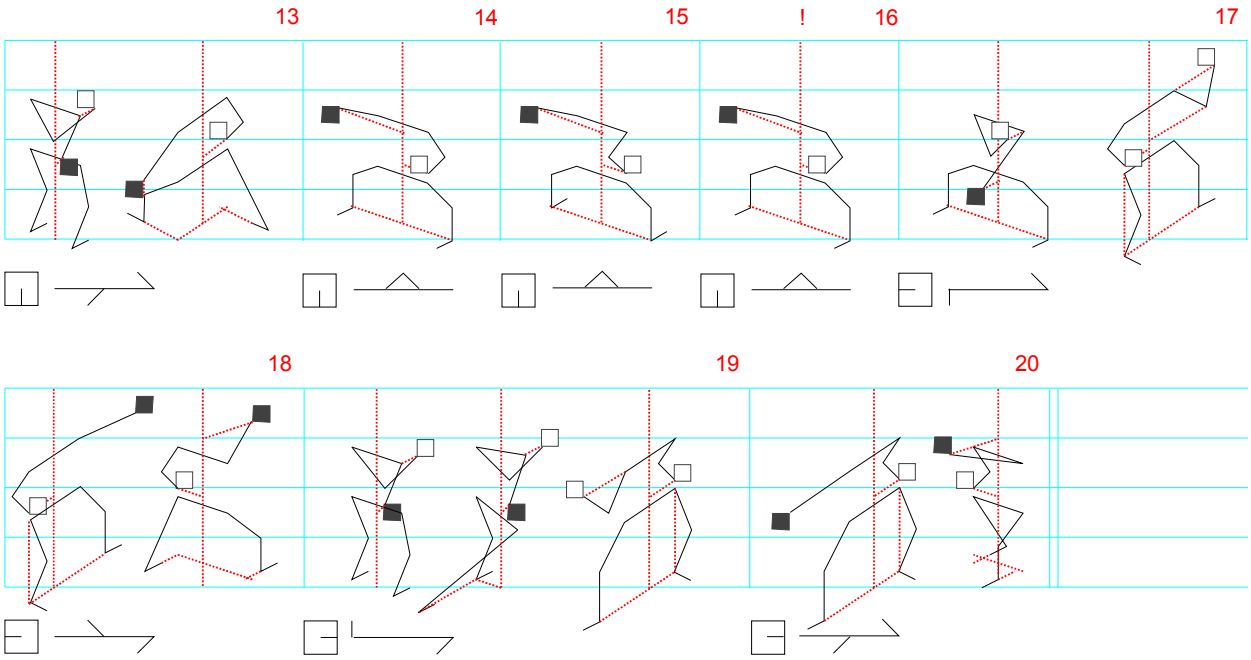


Illustration 35: Ech Chan Shim Bu (continued)

Pyong Cho Dan

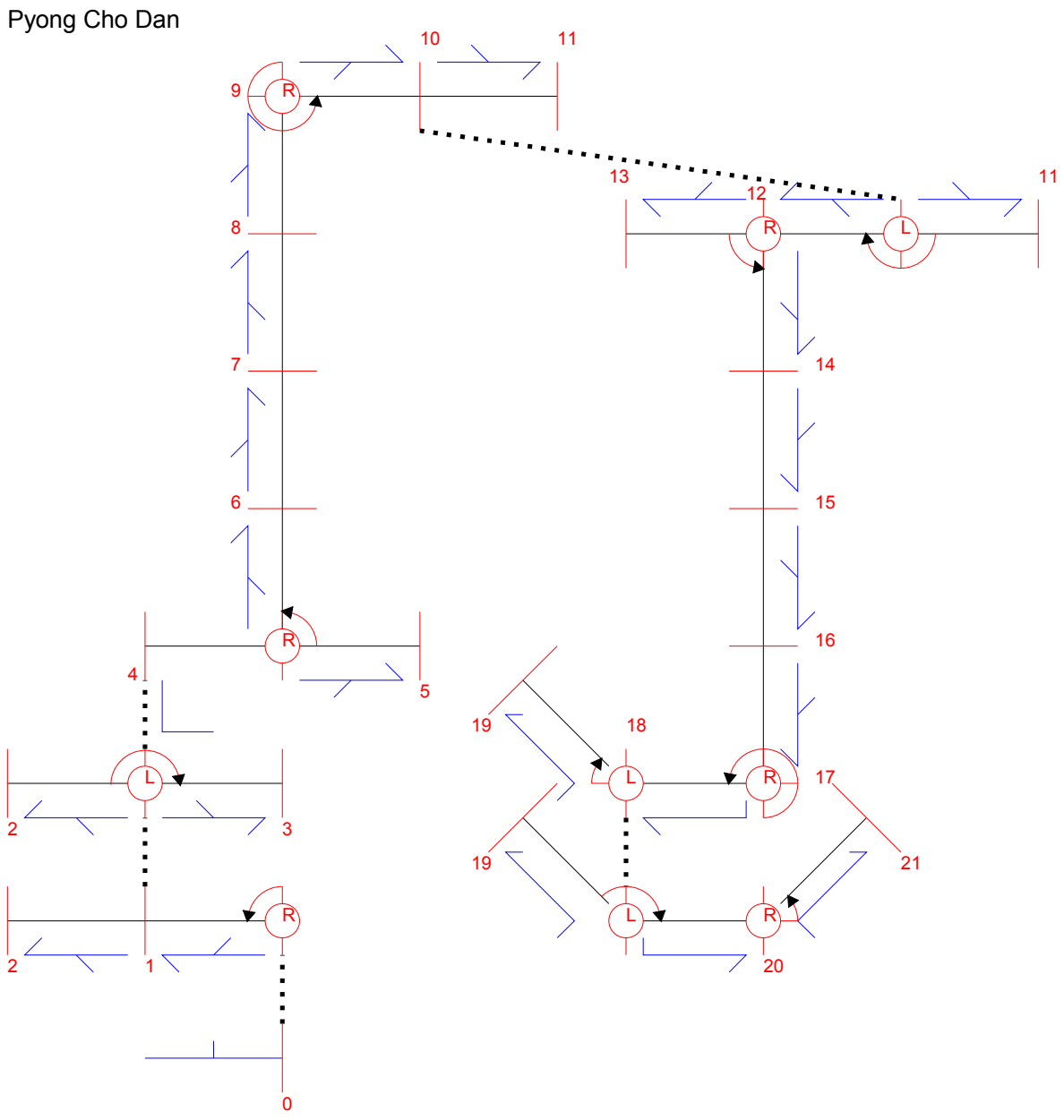


Illustration 36: Pyong Cho Dan Path Diagram

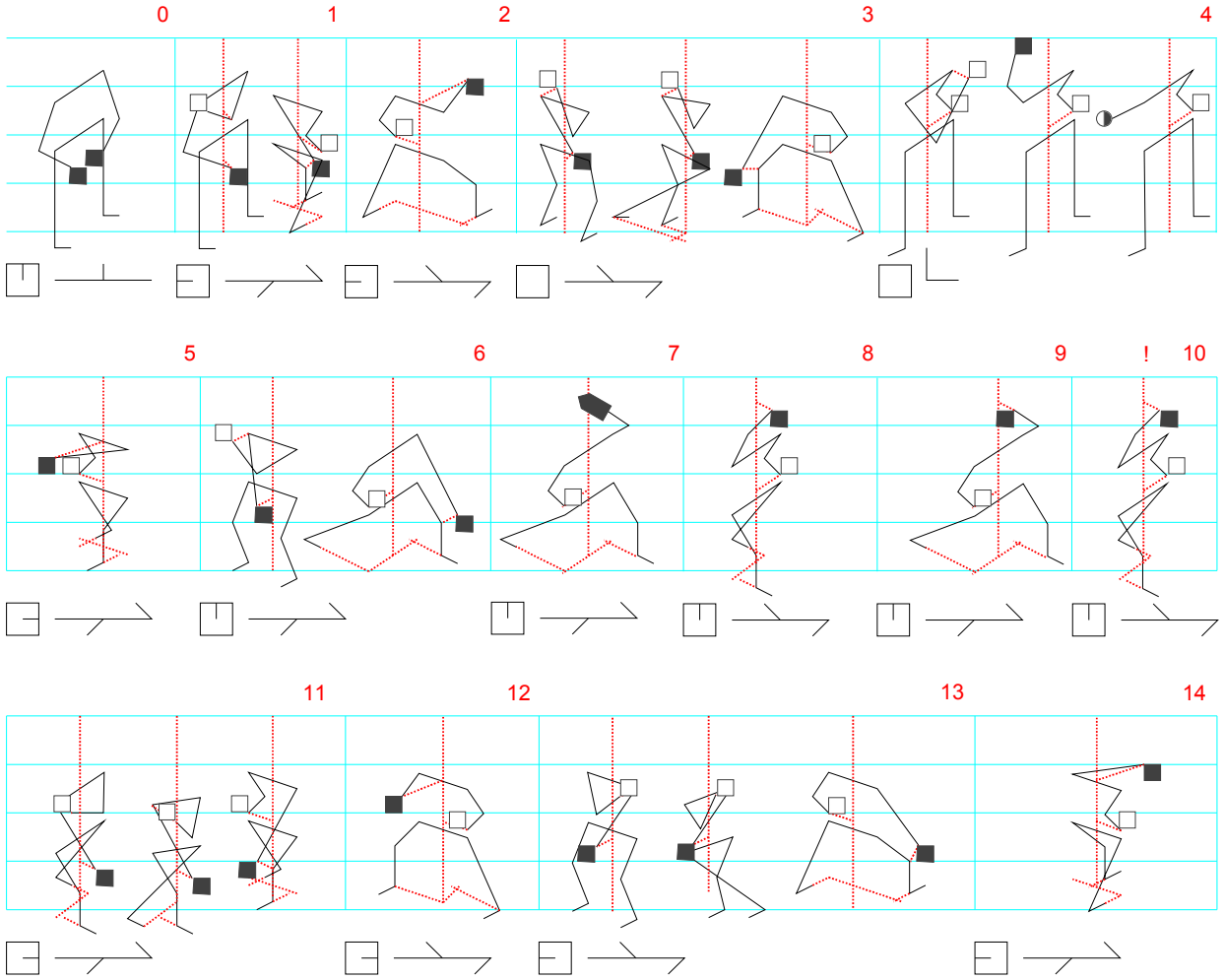


Illustration 37: Pyong Cho Dan

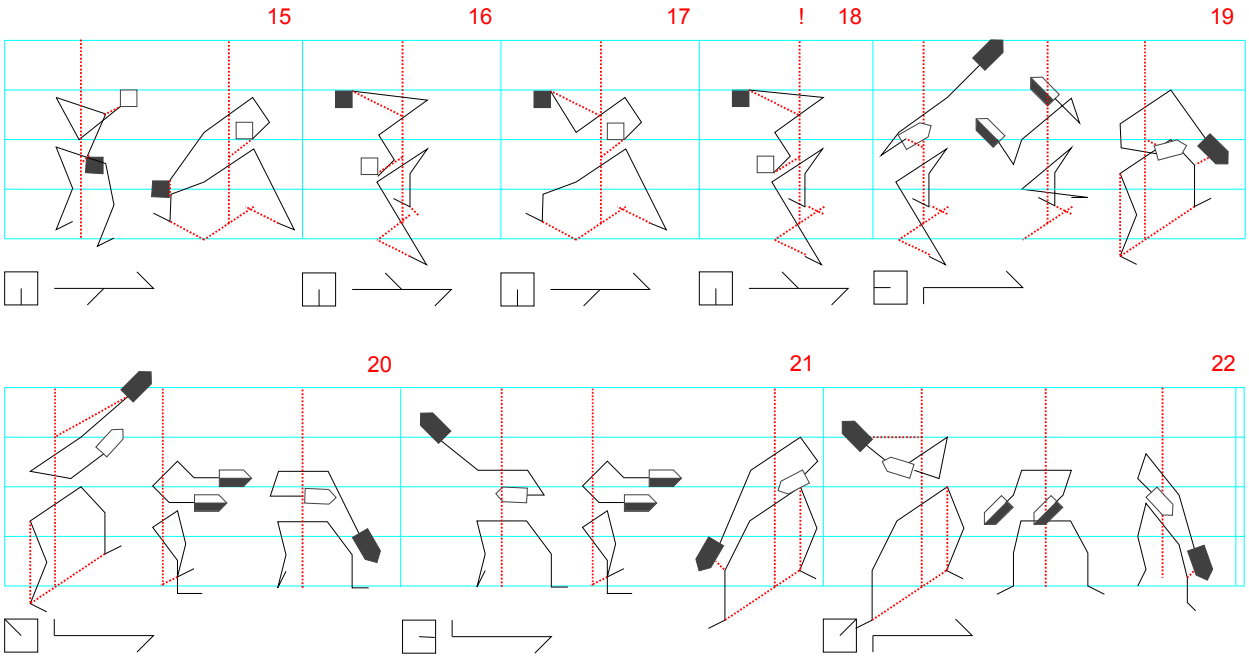


Illustration 38: Pyong Cho Dan (continued)

Pyong E Dan

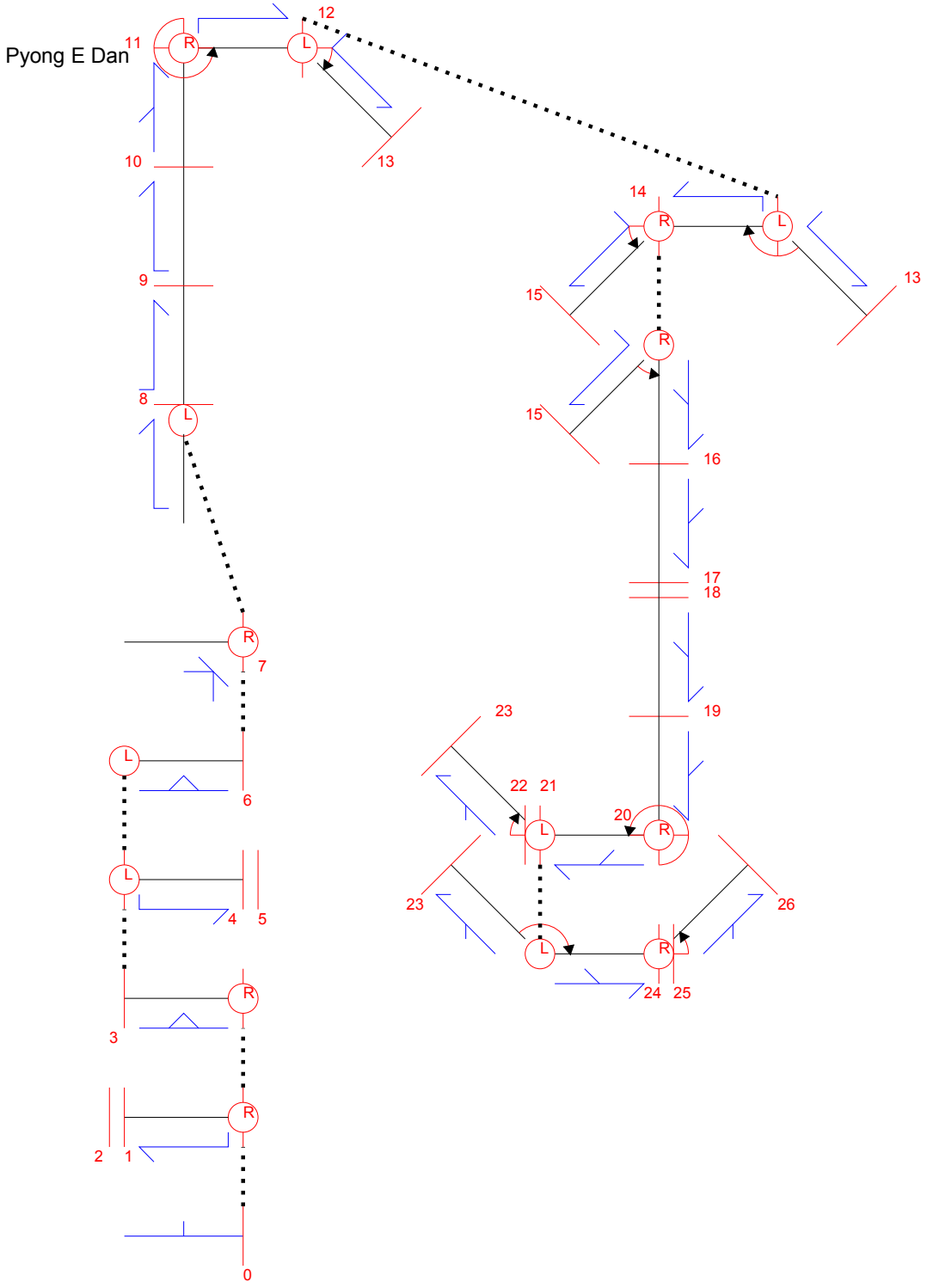


Illustration 39: Pyong E Dan Path Diagram

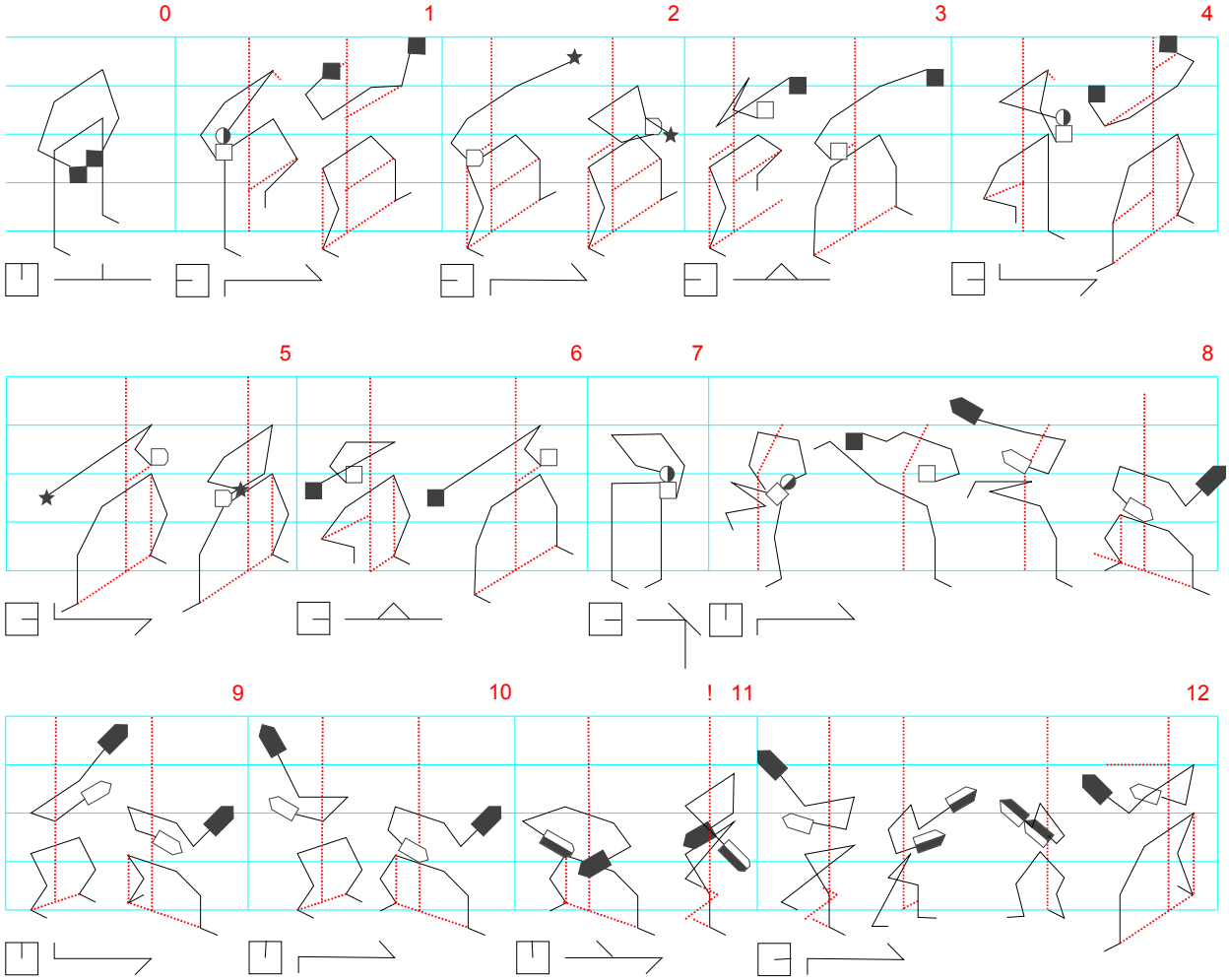


Illustration 40: Pyong E Dan

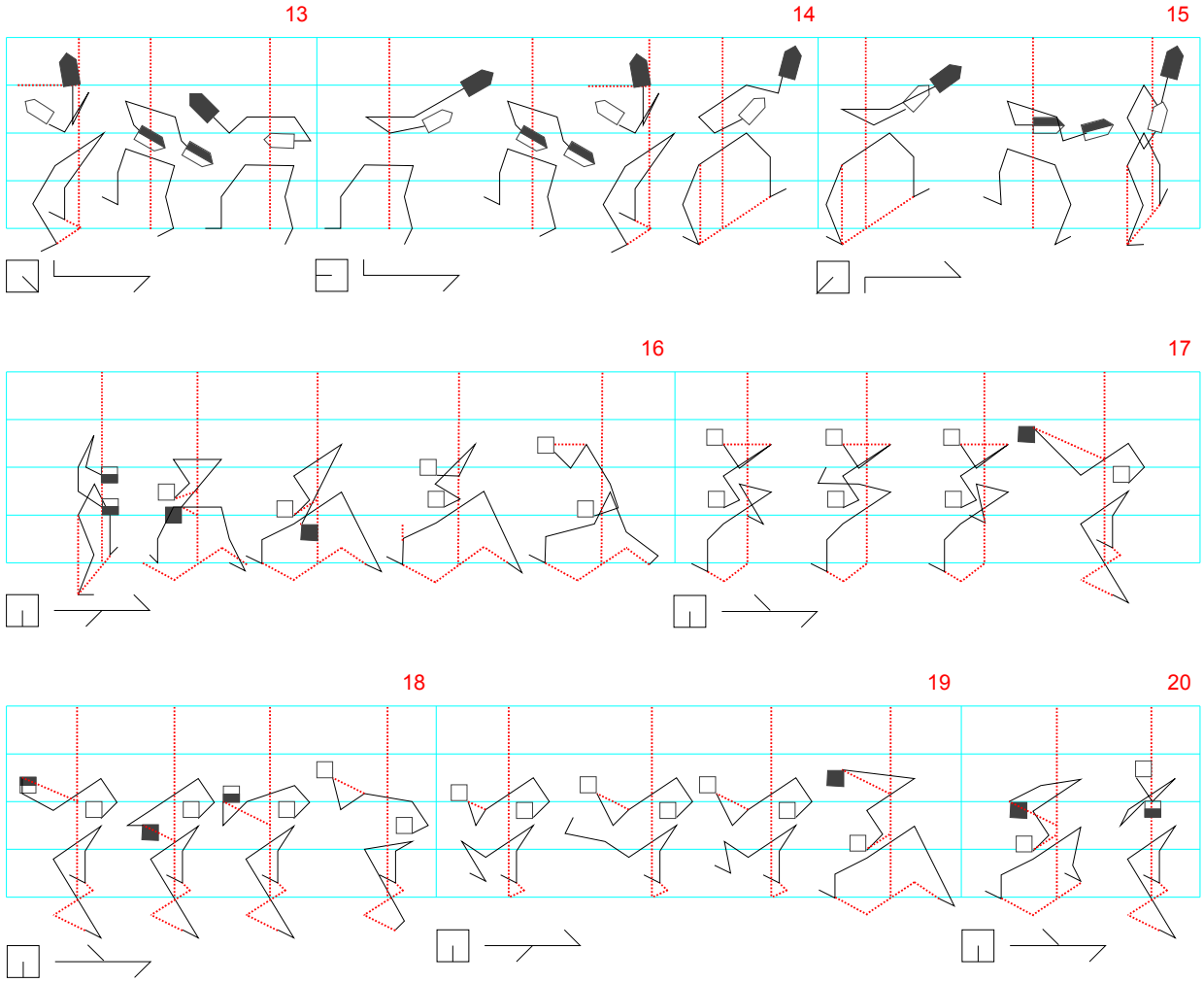


Illustration 41: Pyong E Dan (continued)

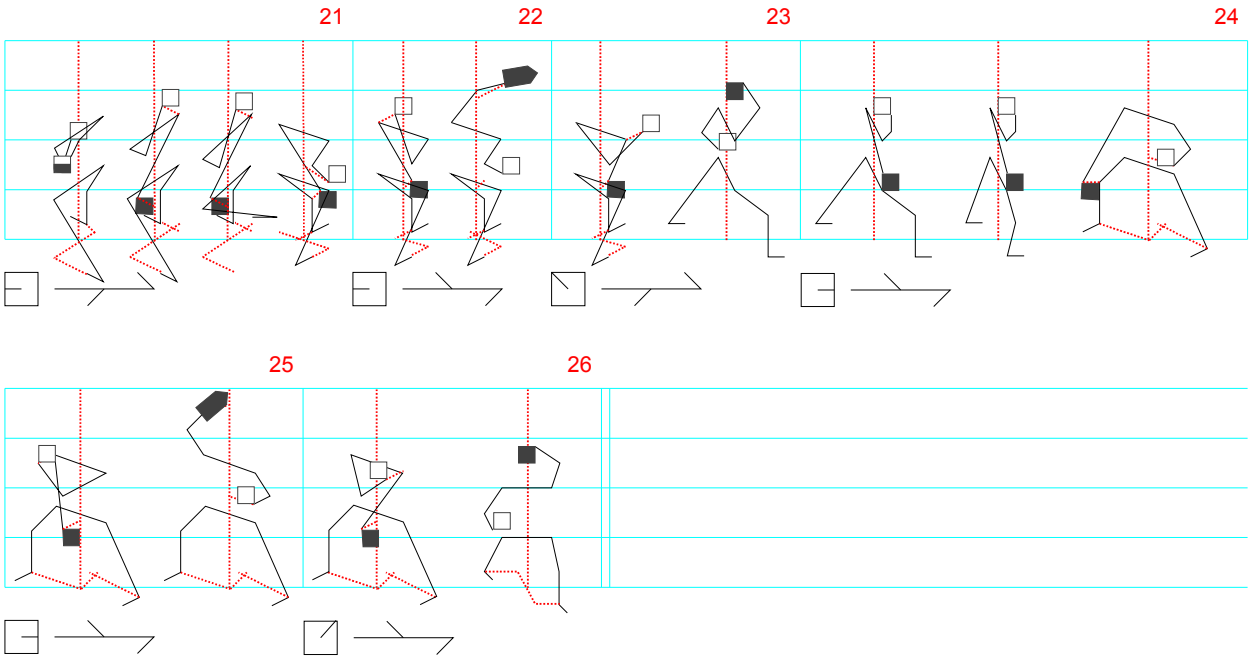


Illustration 42: Pyong E Dan (continued)

Pyong Sam Dan

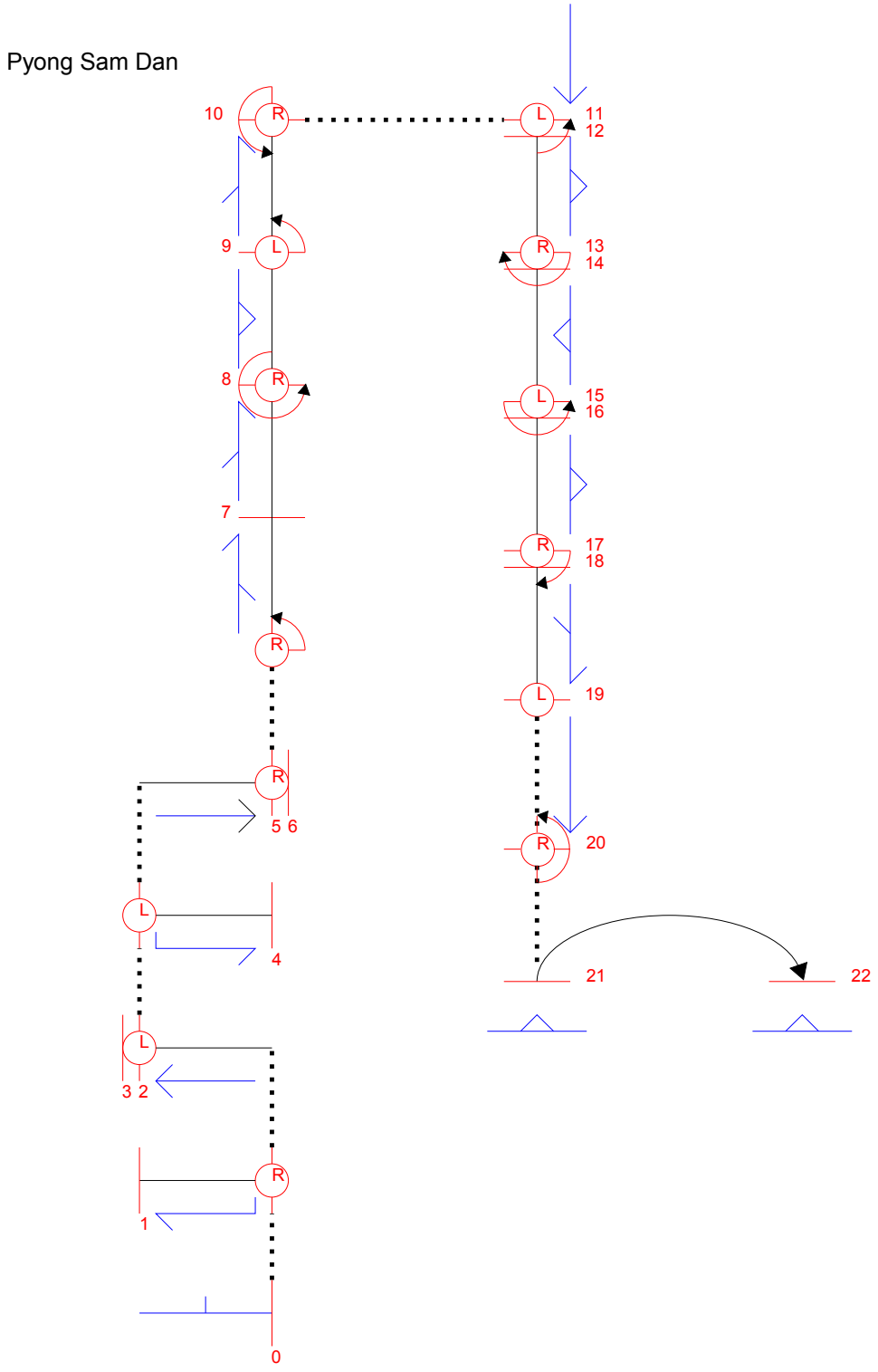


Illustration 43: Pyong Sam Dan Path Diagram

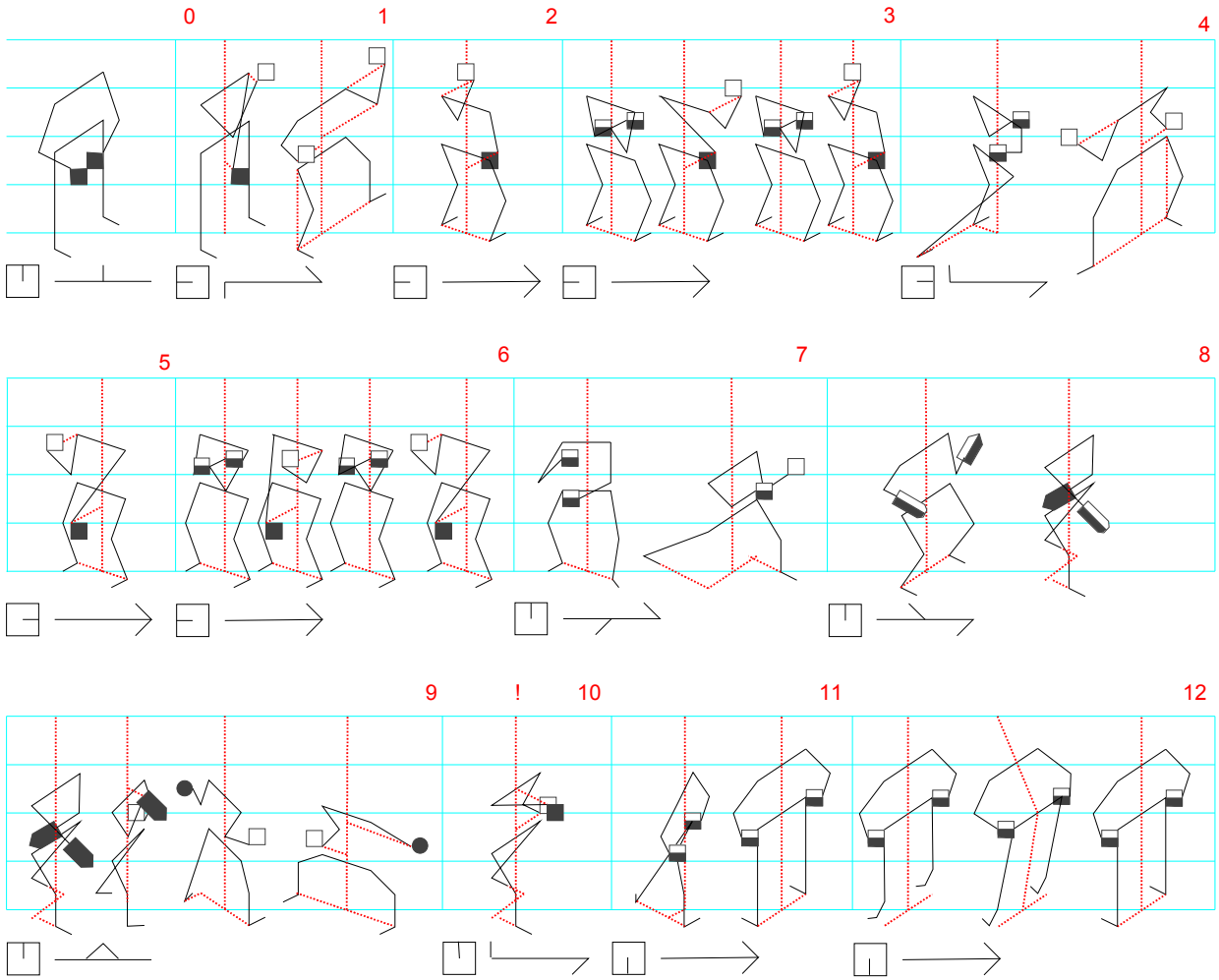


Illustration 44: Pyong Sam Dan

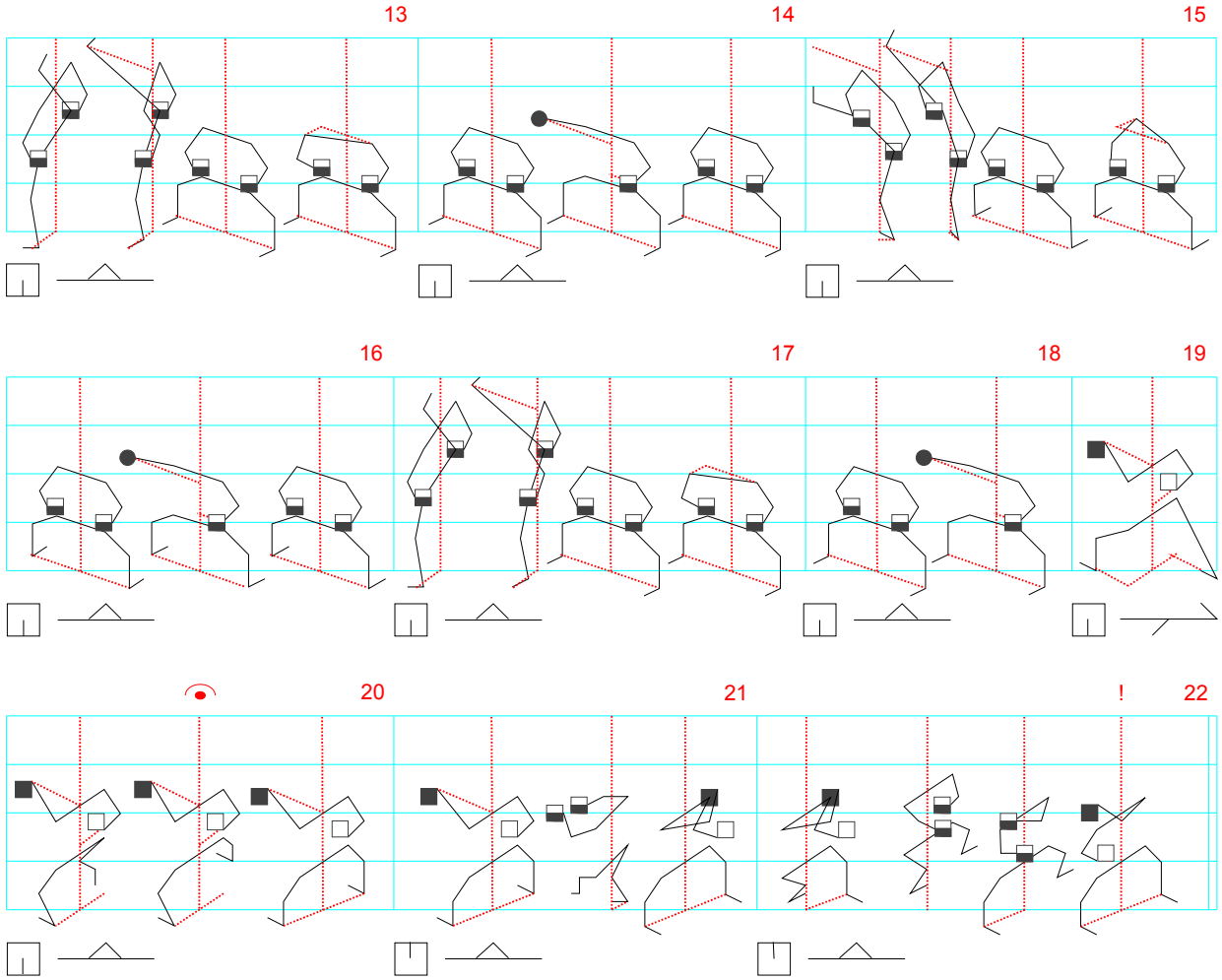


Illustration 45: Pyong Sam Dan (continued)

Pyong Sa Dan

Pyong Sa Dan

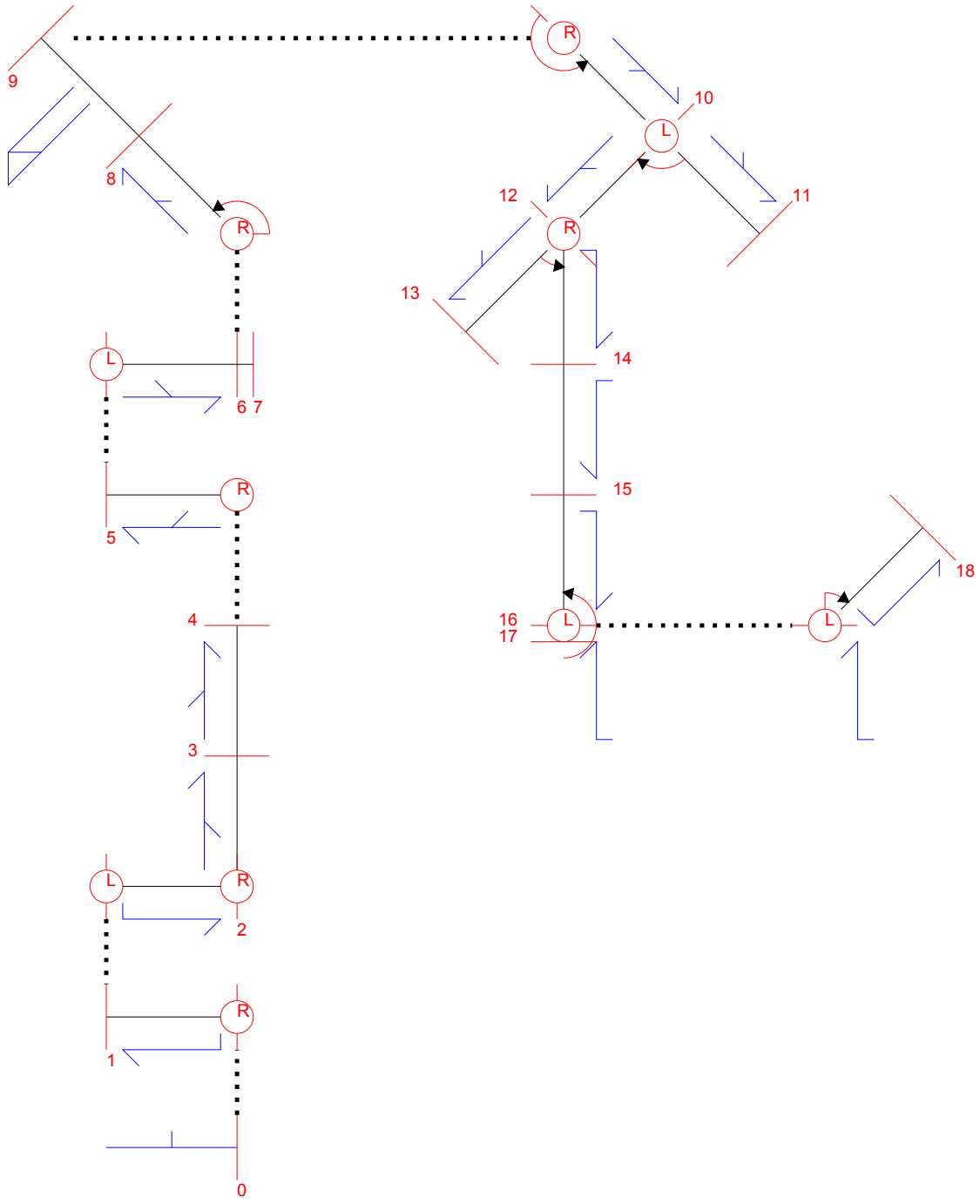


Illustration 46: Pyong Sa Dan Path Diagram

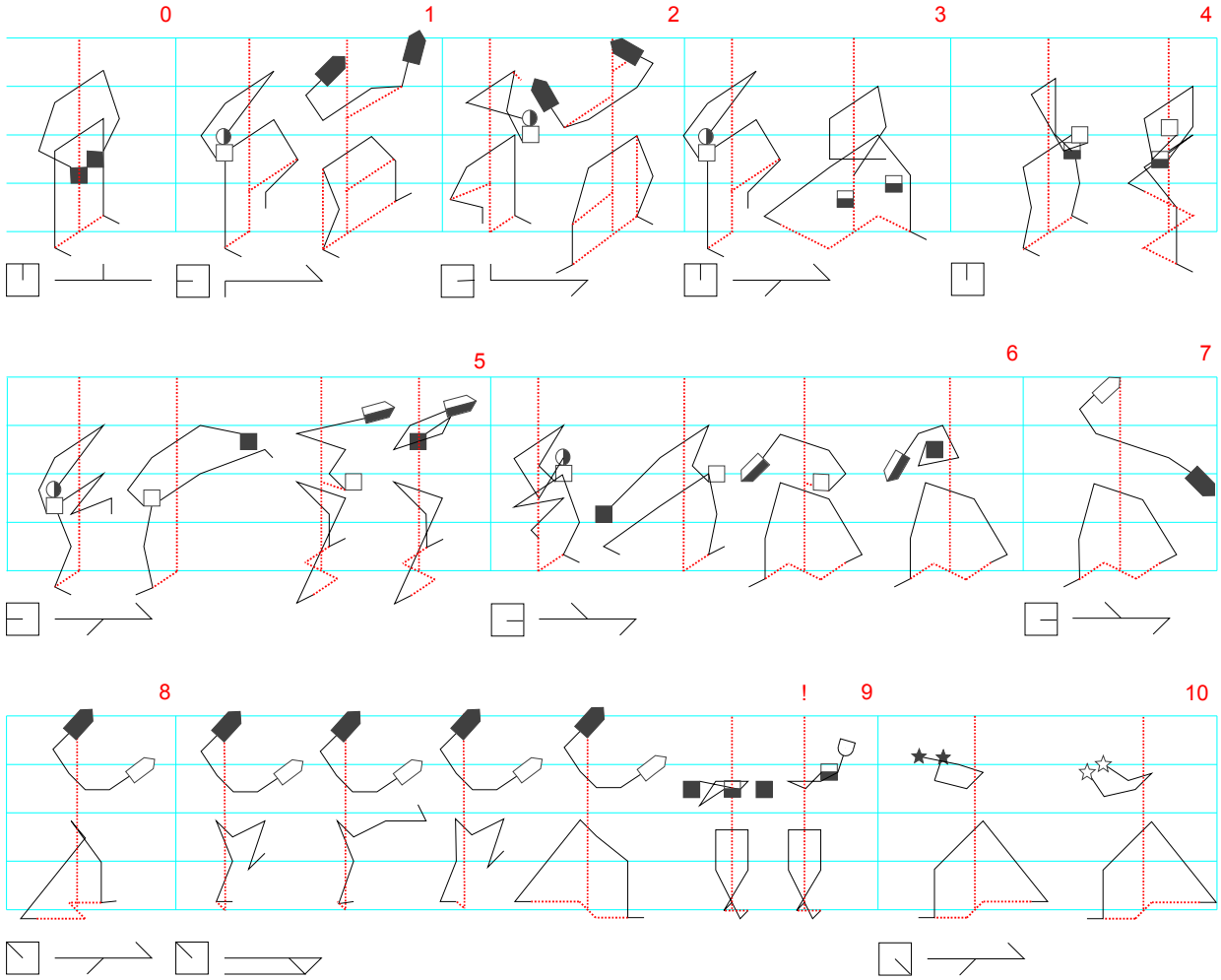


Illustration 47: Pyong Sa Dan

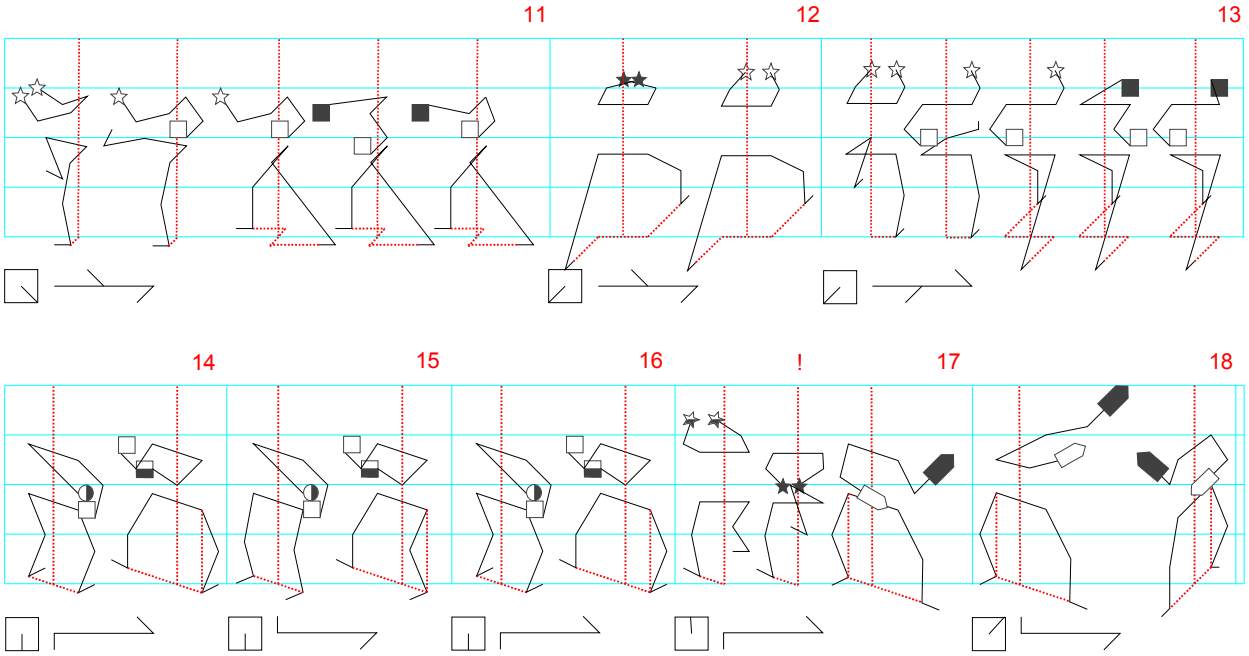


Illustration 48: Pyong Sa Dan (continued)

Pyong O Dan

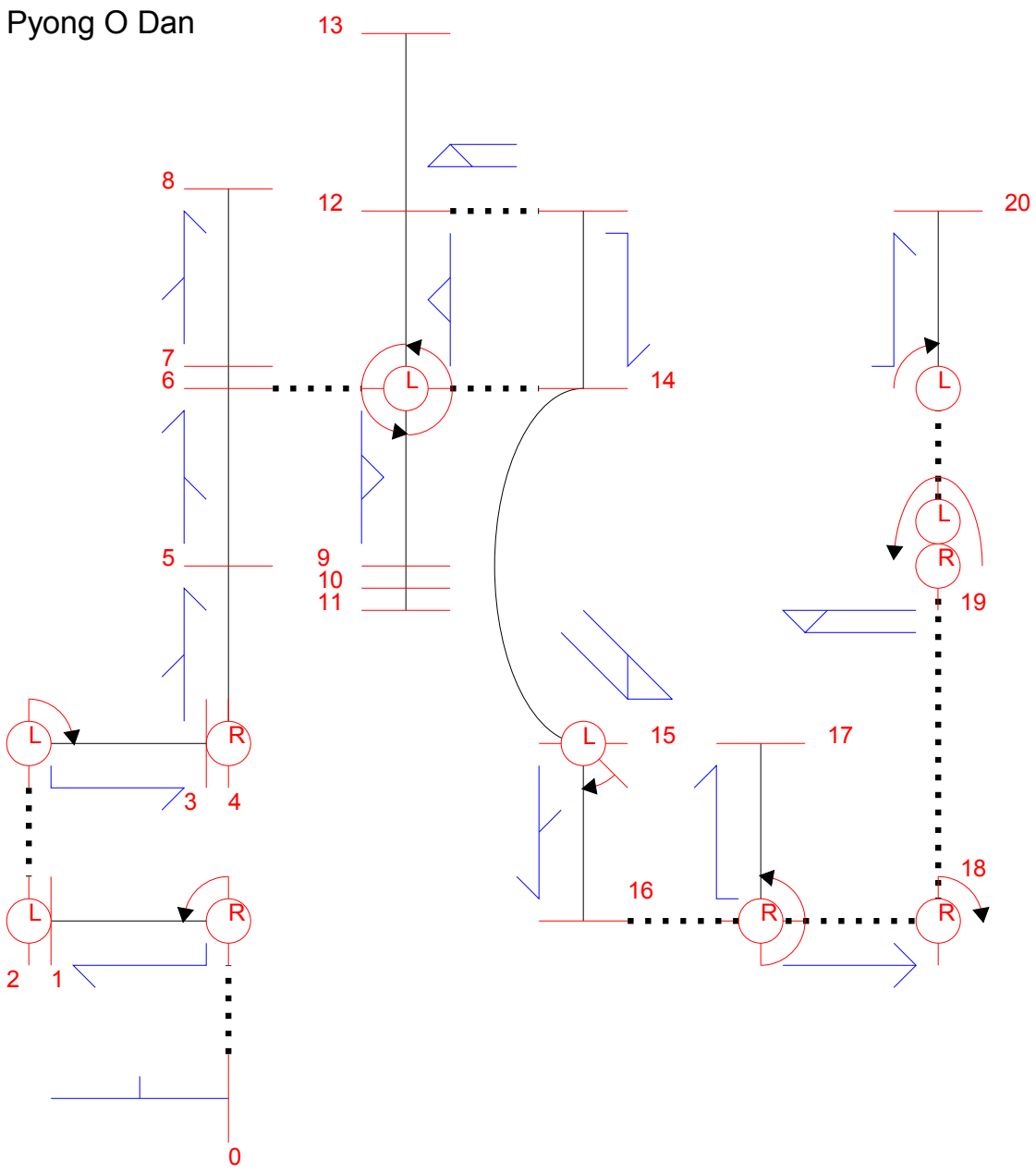


Illustration 49: Pyong O Dan Path Diagram

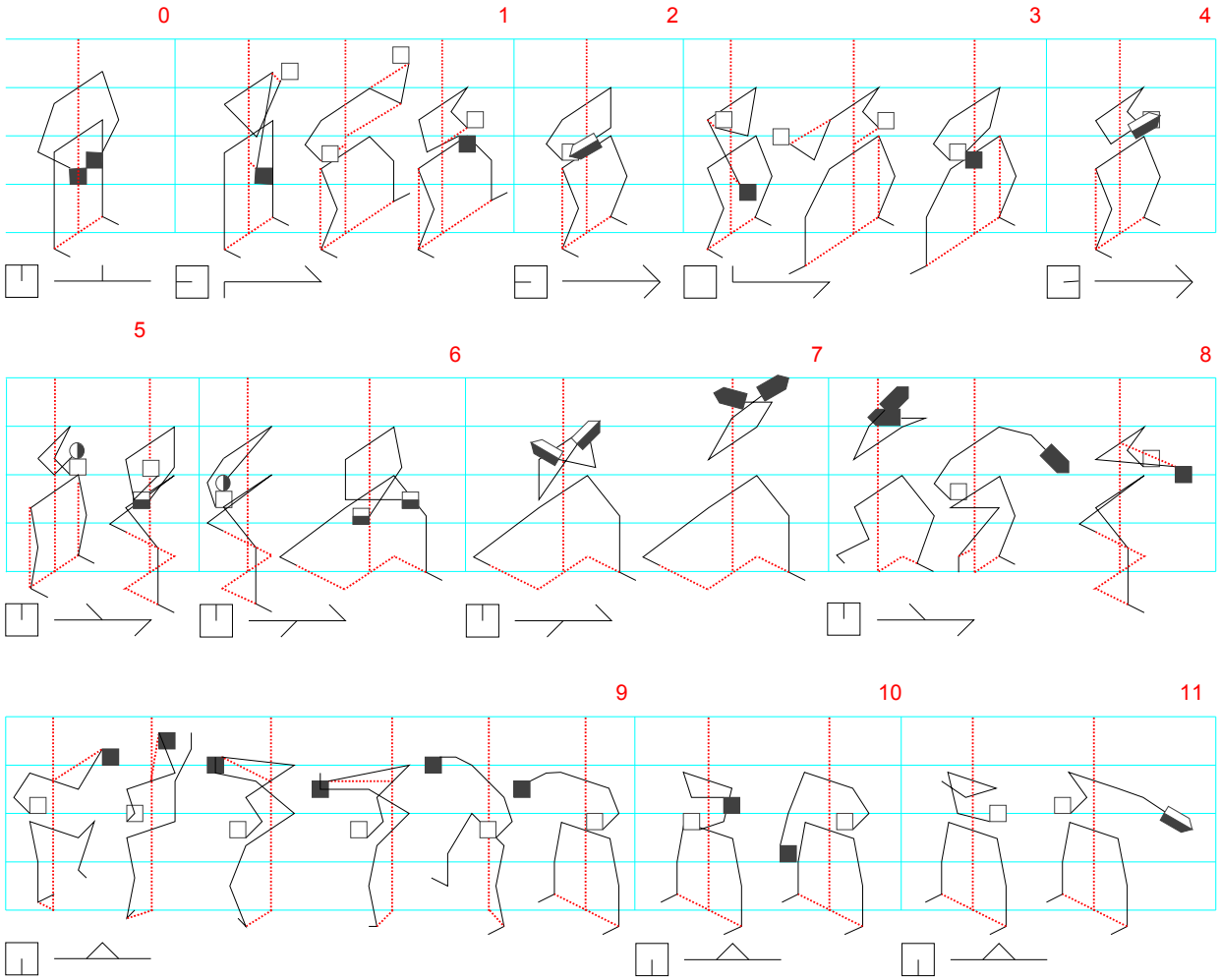


Illustration 50: Pyong O Dan

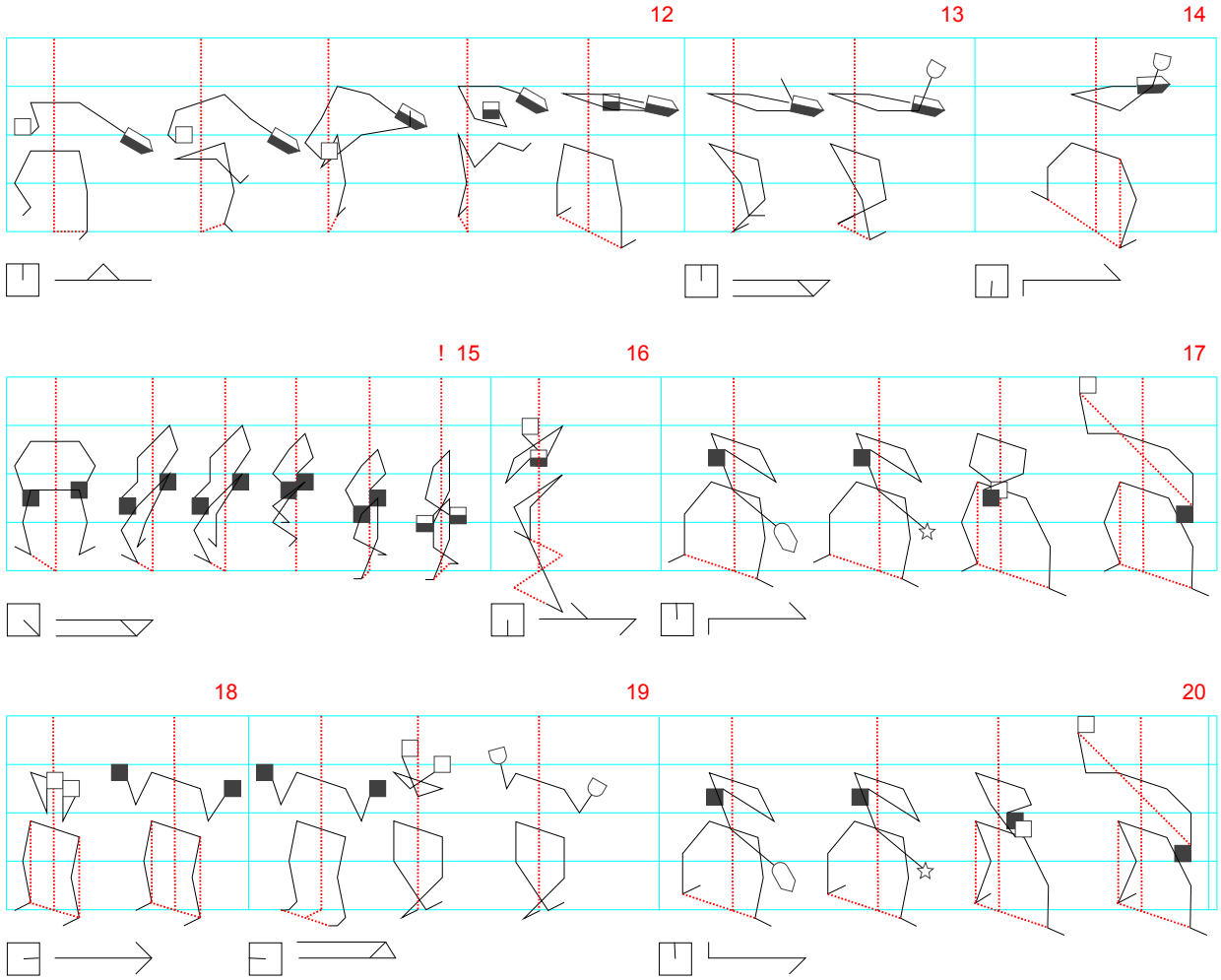


Illustration 51: Pyong O Dan (continued)

Passai

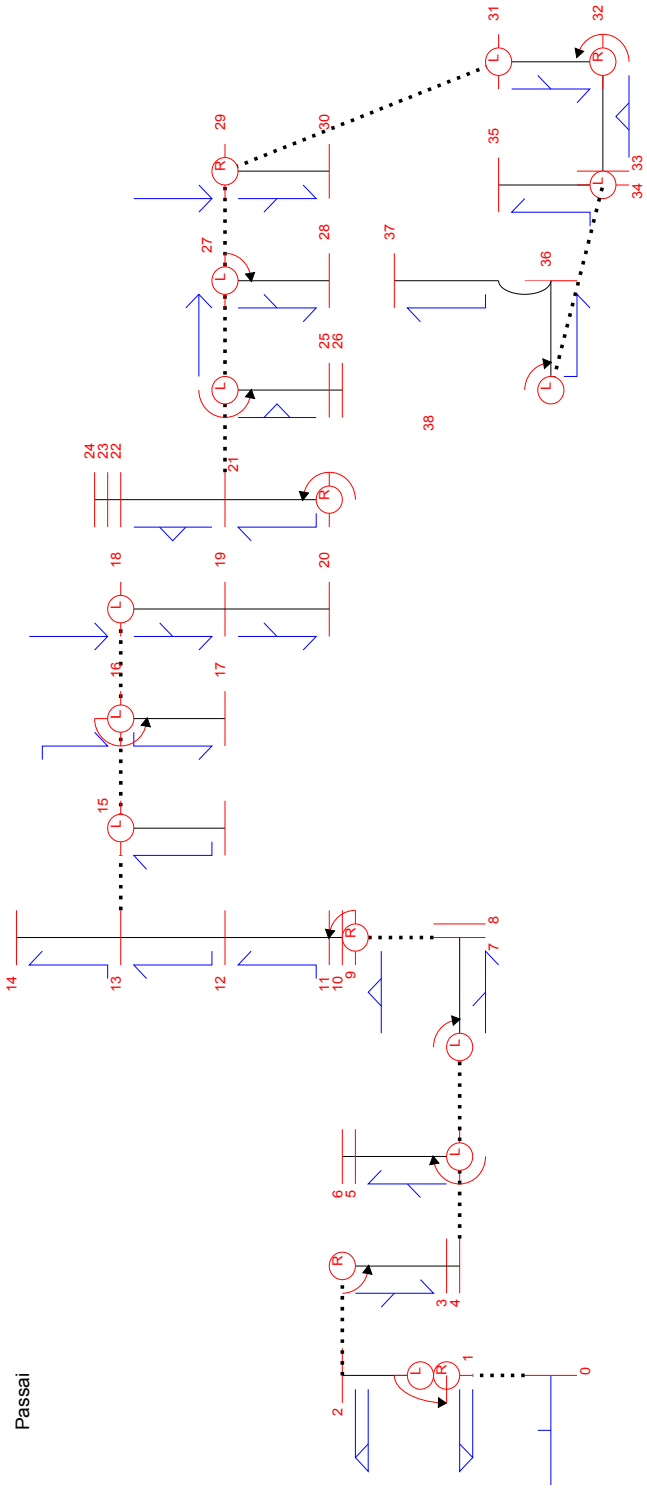


Illustration 52: Passai Path Diagram

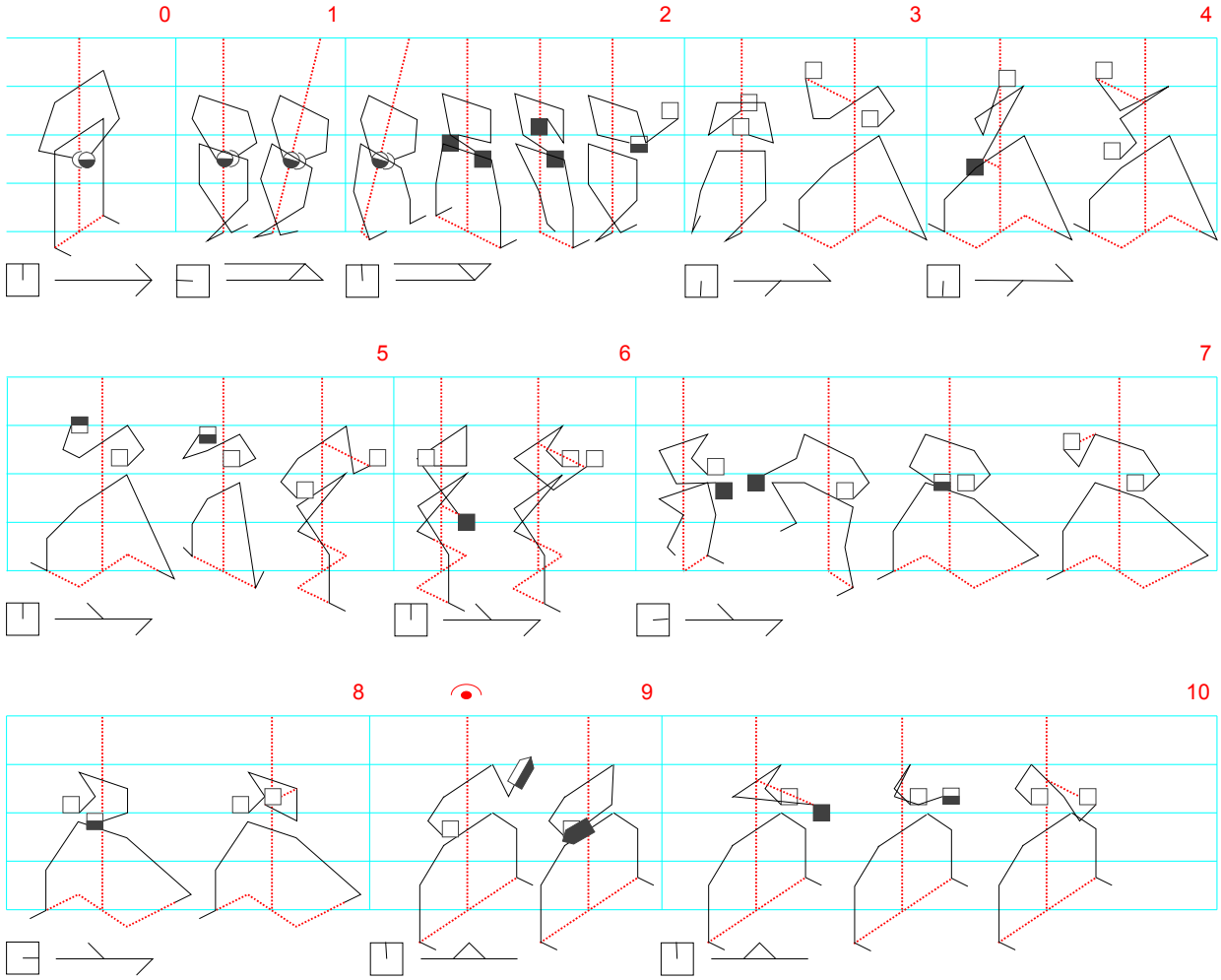


Illustration 53: Passai

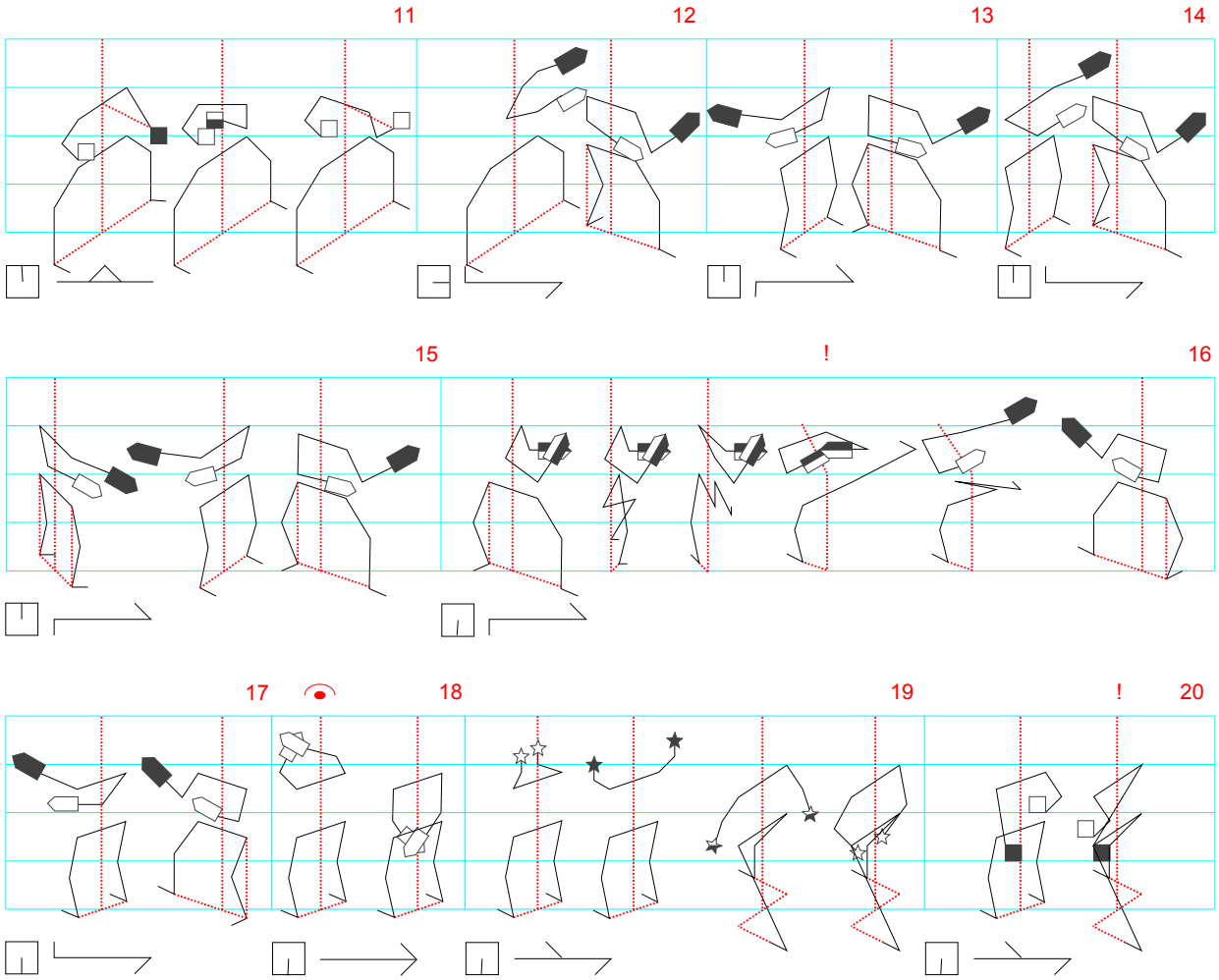


Illustration 54: Passai (continued)

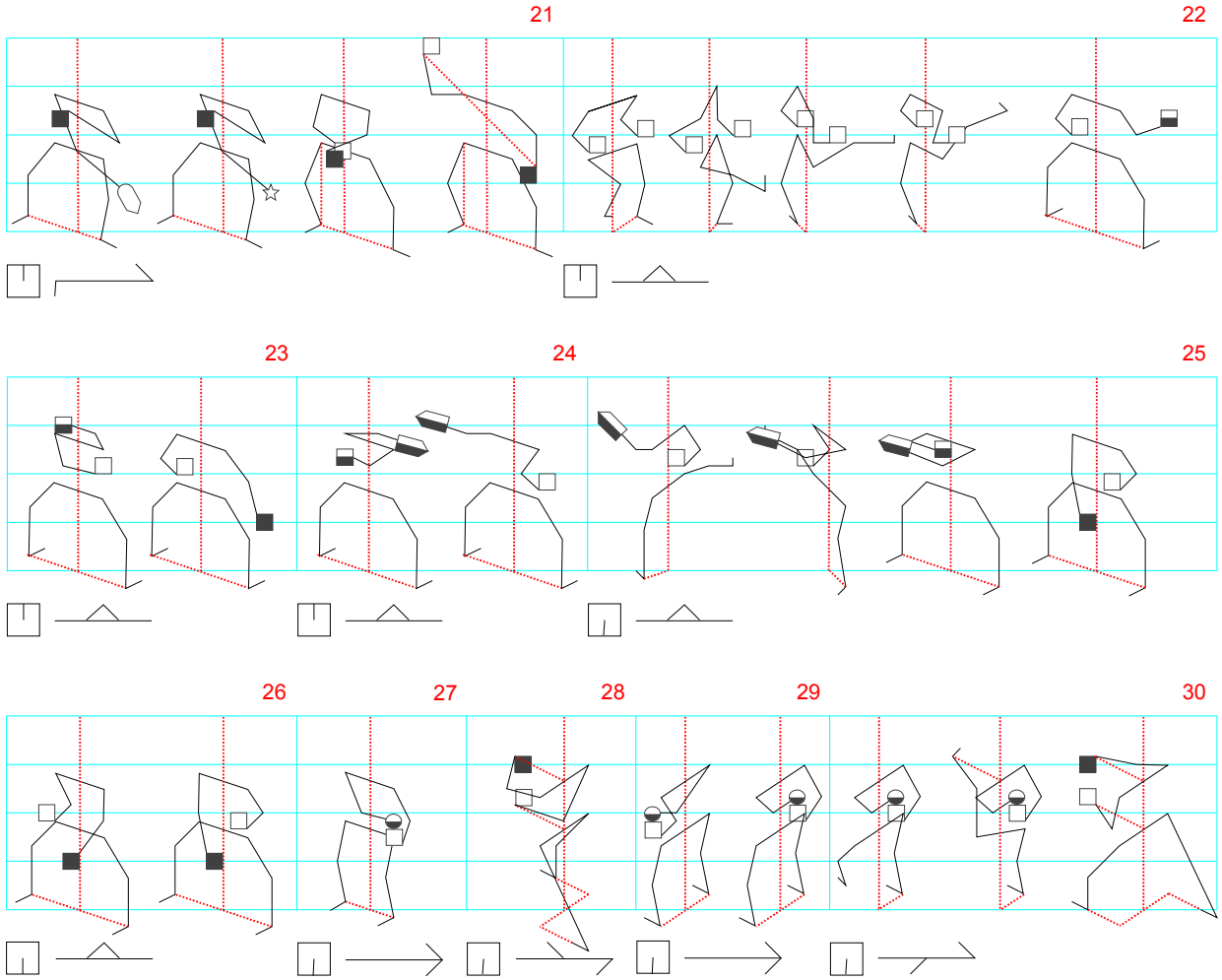


Illustration 55: Passai (continued)

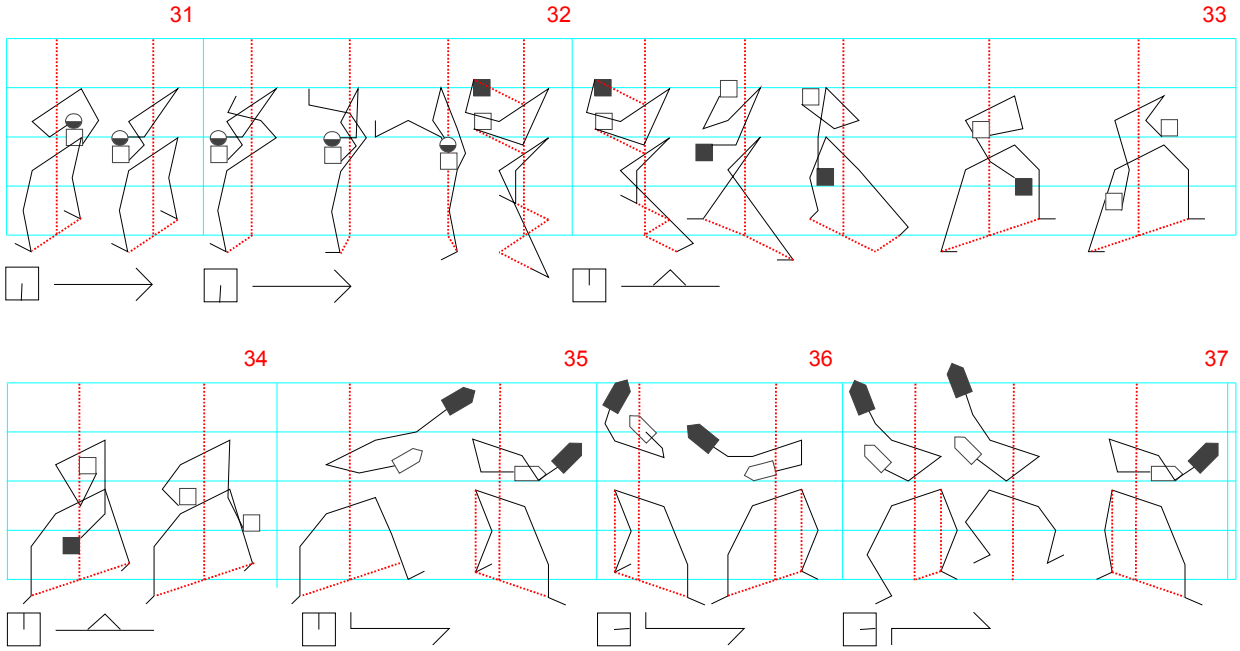


Illustration 56: Passai (continued)

Beyond Basic Forms

The notation is extensible to documenting weapons' forms (which require the addition of a 'prop' held by the actor). In the example provided, the weapon is shown in blue. The weapon becomes a part of the actor-model, with the distinction that it can change its relationship to the other components of the actor model at any time.

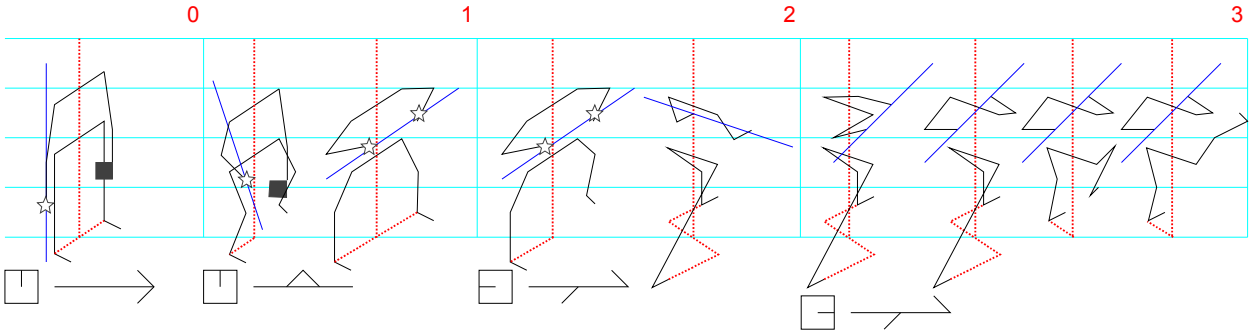


Illustration 57: The Beginning of Bo 1

The notation may also be extended to step-sparring. The attacker is shown in red, and the defender in black. The guide lines show the vertical center axis for each actor, and the bases of the center lines are connected by another guideline.

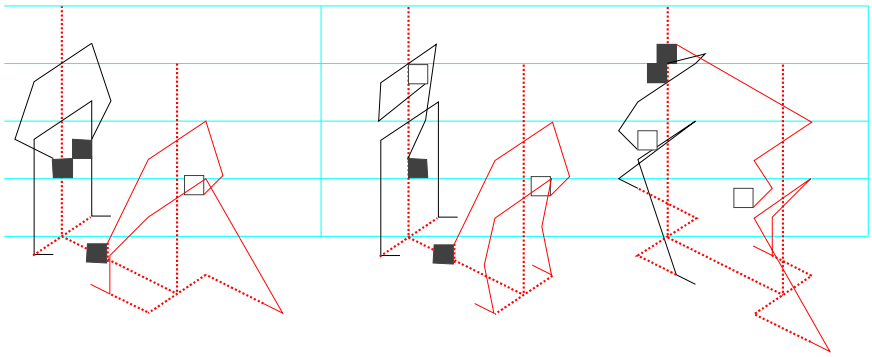


Illustration 58: The First Step of the Three Step

Addendum – A Sample of Proposed Changes

The attached diagram is a reworking of the diagram for Ech Chan Cho Bu. It incorporates several changes that I began to consider in the process of producing the diagrams in the main paper, as well as several alternative notations for showing turns in a form. These are presented to the board as possible changes to the original set of diagrams, for the purpose of increasing clarity. Some of these changes are a result of increased facility with the tool I used to produce the diagrams; others are proposed because the original convention I used in the diagrams does not seem adequate.

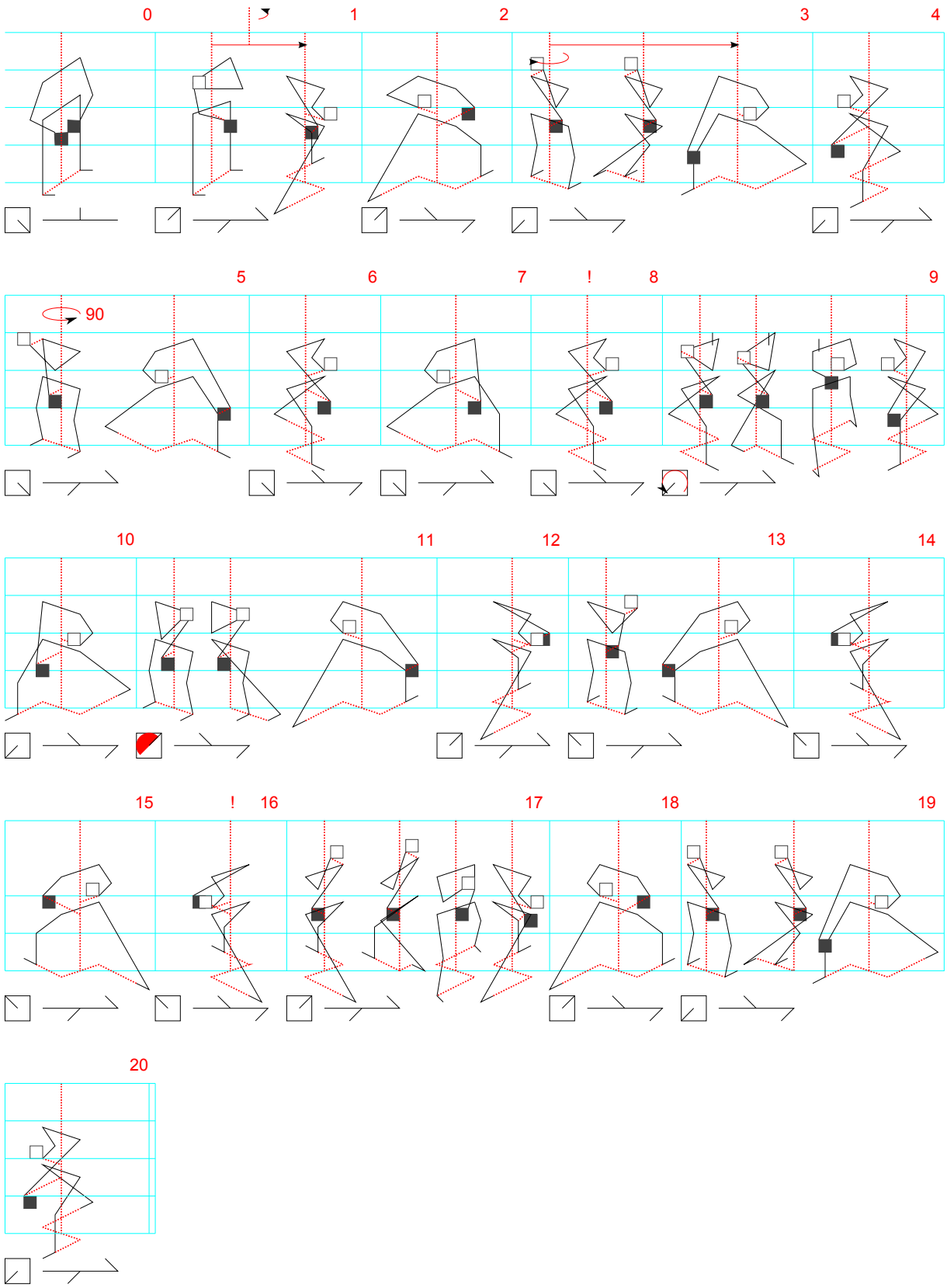
A summary of the changes:

1. The dotted red guidelines are now consistently placed throughout the diagram. Every centerline is now grounded on the bottom line of the staff, and the guidelines for feet are now consistent in their angles and lengths. Guidelines for hand placement are now consistent for placement off shoulders and knees, and the guideline showing position of the low punch is now consistent both in reference to the centerline and distance from the centerline. This change will be applied throughout the diagrams.
2. The diagrams are now done on pages of five lines, rather than pages of three. This (combined with the cleanup of the diagrams) will allow many forms to be diagrammed on a single page. The diagrams were originally designed to be presented in a landscape format (turned 90 degrees on the page). I thought this would be necessary to make the diagrams large enough to be clear. When I realized most people would read electronic copies of the paper, I reoriented all the diagrams (save for the path diagram of Passai); it became evident that the diagrams were still legible and that I could save considerable space (and paper) by collapsing the diagrams in this way. This change will be applied to all the diagrams.
3. The convention for placing open, partially filled, and filled hand symbols is consistently applied now. Arms attach to open symbols at a base corner of the symbol; to filled symbols at a top corner of the symbol, and to partially filled symbols in the middle of a side of the symbol. This convention still breaks down for symbols such as the back fist, and cup-and-saucer, grab, and hammer fist; and may not work well for knife hand, ridge hand, and spear hand. The board's feedback on this element of the diagrams will be useful.
4. The “stage diagram” boxes at the beginning of each measure have been changed. Originally the boxes were drawn with the “front” of the room at the top of the box. The new diagram has the front of the room at the lower right corner of the “stage diagram” box. This means that the line showing facing in the box now matches the facing of the stick figure, and that it is no longer necessary to rotate everything 135 degrees in your head to make the two match. This change will be applied if the board feels that it improves the clarity of the diagrams.
5. Several mechanism have been presented for showing rotation direction on the diagrams. In measures 1, 3, and 5 notations have been added to the staff showing rotation. In measures 9 and 11 notations have been added to the stage diagram box showing rotation. In measures 1 and 3, a red line connects the centerlines of the stick figures at the start and end of the rotation. The direction of rotation is shown by an arc in each measure; in measure 1 the arc is drawn about a centerline drawn over the solid red line while in measure 3 the arc is dranw about the centerline of the starting stick figure. The arrowhead shows rotation direction and the endpoints of the arc show starting and ending facings. In measure 5, a nearly complete ellipse shows rotation about the centerline, with the amount of rotation (in degrees) next to the ellipse. In measure 9, an arc is used in the stage diagram to show the direction of rotation. In measure 11, rotation is shown by a wedge swept out by the facing line. One of these techniques (or some combination of

them) will be adapted to the diagrams based on the board's input. **N.B.: Some forms (such as Pyong Cho Dan) require two rotation indicators on a single move, as the head rotates 45 degrees in one direction while the body rotates 135 degrees in the opposite direction; the chosen notation must support this.**

6. Measure 9 demonstrates the use of line weight to make it easier to follow limbs through a complex rotation. It also uses a short marker line on the shoulder line to indicate head facing. When present, the marker indicates the head should be turned toward that shoulder; when absent it indicates the head should not be turned. This is principally of use when showing rotations but also important when diagramming back stance facing and transitions in forms such as Pyong Cho Dan and Pyong E Dan. The board's feedback the use of line weight will determine how it is applied to the diagrams.

I look forward to feedback from the board on these issues, and on the diagramming technique in general.



Ech Chan Cho Bu (revised) with Additional Proposed Changes

A Note On Illustrations

Beginning with illustration 12, all illustrations are the original work of the author. Prior to illustration 12, most of the illustrations are taken from open media sources. The sources of all those early illustrations are documented here. Illustrations which are not original works of the author will be replaced in the “final” copy of this document, to remove any possible licensing entanglements.

Illustration 1: Feuillet Path Notation

This is an original image generated in Inkscape based on the path shown in illustration 3.

Illustration 2: Feuillet Notation for a Jete (Jump)

This image is from Paige Whitley-Bauguess' website BaroqueDance.com. The original image is clearly scanned from an older text, but no attribution is provided on the website.

Illustration 3: Feuillet Notation for the Bacchante: Path, Steps, and Music

This image is a derived work from an image on Paige Whitley-Bauguess' website BaroqueDance.com. The original image is clearly scanned from an older text, but no attribution is provided on the website.

Illustration 4: Stepanov Notation from the Ballet Bayadere Circa 1900

This image comes from the wikipedia article on Stepanov Notation. The image is tagged as being in the public domain within the United States because its copyright has expired.

Illustration 5: Labanotation Symbols for Parts of the Body

This is a wikimedia commons image used in the wikipedia article on Labanotation.

Illustration 6: Labanotation Movement Diagram (Left) and Dynamic Diagram (Right)

This image is a derived work formed by combining separate wikimedia commons for Labanotation Movement Diagrams and Labanotation Dynamic Diagrams, both used in the article on Labanotation.

Illustration 7: Sample Eshkol-Wachman Notation

This image comes from the wikipedia article on Eshkol-Wachman Movement Notation. The image was posted by its creator (apparently Osnat Teitelbaum of the University of Florida at Gainesville), who released it into the public domain.

Illustration 8: Valerie Sutton in a ballet pose, with the corresponding DanceWriting representation

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Illustration 9: Symbols for Static Gestures in SignWriting

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Illustration 10: Showing Motion in SignWriting

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Illustration 11: SignWriting Symbols for Index Raised Knuckle, Middle Raised Knuckle, Index Middle Raised Knuckle

This image is a derived work formed by combining three of the symbols found in SSS-2004.