

Understanding Keyboard Symmetry

At first glance, the keyboard appears to be asymmetrical, given the changing arrangement of the black keys in groups of both two and three. A closer examination, however, reveals that the keyboard is perfectly symmetrical, or mirrored, with respect to the notes *D* and *Ab*. This type of symmetry is *inversional* symmetry; the interval pattern produced by an ascending pitch succession is produced by descending. In other words, the keyboard to the right of D4, for example, is a mirror image of the keyboard to the left of D4. The same mirrored symmetry also appears from Ab4. Accordingly, any ascending interval pattern played by the right hand from D (or from any note that lies at specific interval above D) can be matched equally by the left hand playing the same interval pattern descending from D (or from any note that lies at specific interval below D). Additionally, the fingers in the left hand, and the distances which separate them, correlate perfectly with the distances which separate the fingers in the right hand.

For example, the interval pattern W-W-H-W-W-W-H, which gives us a D major scale when played in the right hand up from D (D, E, F#, G, A, B, C#, D) produces the exact same fingering (and interval and finger distances) when played down from D in the left hand. In this case, the Bb major scale, from D to D and octave lower is produced (D, C, Bb, A, G, F, Eb, D).

There are a number of ways to take advantage of a knowledge of this symmetry. Awareness of keyboard symmetry provides a physical and psychological centering at the keyboard for the performer. Since the black key groupings are the same number and distance both above and below D, this awareness can be used to promote a tactile and kinesthetic knowledge of the keyboard. From middle D upward, for example, the distance and interval that the right hand has with any black key can be matched by a corresponding distance and interval in the left hand to a particular black key below middle D. The principle also applies to the white keys.

In the exercises below, the two notes on each beat are the same color and distance from middle D. The first exercise is the F# major scale played in contrary motion from D# in the right hand, and C# in the left. The second exercise is the C# melodic minor scale played in contrary motion from the same two notes.

These exercises can be used in a number of ways. First, by playing them without looking at the keys, you can actively develop a tactile knowledge of the keyboard, being directly aware of the black key groupings in each hand. This knowledge will enable you to develop a sense of keyboard distance and interval relationships.

Second, since the motions, fingerings, black key/white key relationships, and hand distance from the body are symmetrically identical in each hand, the exercises can also be used to easily and comfortably practice, with both hands, any principle that applies to hand, wrist, and arm position in the playing of scales. For example, wrist height (which is raised as the hand moves to the pinky), arm height (which is raised for playing on the black keys), and lateral hand movement (which is used to keep each playing finger in line with the forearm) are identical for both hands for each note (on the same beat) in both exercises.

3 1 2 3 4 1 2 3

Black Key Groupings:

Sva

Svb

Sva

Svb

Example 1: Symmetry Exercise #1

3 1 2 3 4 1 2 3

Black Key Groupings:

Sva

Svb

Sva

Svb

Example 2: Symmetry Exercise #2

Finally, a knowledge of keyboard symmetry can be useful for translating fingerings from one hand to the other. Since the keyboard to the right of middle D is a mirror image of the keyboard to the left of D4, any ascending pattern has an identical descending pattern that is related to it through inversional symmetry. Accordingly, the fingerings, finger distances, and intervals for mirrored scales and chords will be the same for the two hands. For example, an Eb major scale from D to D in the right hand is the mirror image of a descending A major scale in the right hand. After some time, other scales, chords, and other patterns that are related through inversional symmetry will be recognized on the keyboard.

If you are uncertain about whether a particular fingering may be useful and appropriate for the weaker, less experienced hand, the opposite hand can be a guide. Simply invert the musical pattern so the stronger hand plays with a comfortable, natural fingering, and then apply the fingering to the weaker hand. For example, suppose you are looking for a fingering (or additional possibilities for a fingering that you already use) for the left hand in Chopin's Etude Op. 10, No. 12:

Example 3: Chopin Etude Op. 10 No. 12, measures 1-2

You would invert the left hand pattern by creating the same interval pattern in the opposite direction. Regardless of the pattern, always begin the new pattern (for the right hand, in this case) from the note that is as far above D as the left hand's note is below it. This pattern would be:

Half Step
Intervals: 1 2 3 1 1 3 3 1 1 2 3 1 1

Example 4: Symmetrical Inversion of the left hand in Chopin's Etude, Op. 10 No. 12, measure 1

After you arrive at this pitch succession, the fingering possibilities for the right hand can be explored based on this symmetrically inverted passage. Once a comfortable fingering is found, simply use the same fingering for the original left hand passage. This approach, which can easily be applied to more difficult or complex passages, provides an element of psychological security for a left hand fingering that might, at first, feel uncomfortable. After a while, inverting from one hand to the other becomes fairly easy.