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APPLICATIONS OF TAO OF BASS, Vol. I, IN ORCHESTRAL AND SOLO DOUBLE BASS REPERTOIRE

Santiago Zorrilla de San Martin

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APPLICATIONS OF *TAO OF BASS*, Vol. I, IN ORCHESTRAL AND SOLO DOUBLE
BASS REPERTOIRE

by

Santiago Zorrilla de San Martin

A Dissertation
Submitted to the Graduate School,
the College of Arts and Sciences
and the School of Music
at The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Musical Arts

Approved by:

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Dr. Stephen Redfield

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ABSTRACT

This dissertation is not only an exploration of left-hand techniques found in *Tao of Bass, Vol. 1*, but also an inside of the performance and didactic approach of Dr. Marcos Machado to organize and create its content. That said, one of the objectives of this dissertation is to focus on developing an awareness of the didactic strategies in *Tao of Bass* created to develop the utmost proficiency in double bass performance. I expect to prove this objective in my dissertation by acknowledging how *Tao of Bass* encompasses a didactic approach that is universal and academically relevant to prepare for professional performances. In my state of research, I will establish a professional repertoire frame and apply to it *Tao of Bass* didactics. While applying these, I will focus on left-hand techniques contained to perform applications and a path to master both the left-hand technical aspects and the excerpts. In my conclusions I will prove that my ideas have a professional and academic value to the double bass community. In the process of my research, I will establish didactic connections to other pedagogues to discuss parallelisms and innovations by comparing and contrasting with Machado's didactic. Moreover, I strongly believe that this dissertation will contribute positively to the double bass community. It is my desire and expectation that the material analyzed and discussed in this dissertation will help future double bass pedagogues and performers.

ACKNOWLEDGMENTS

This dissertation is not only the culmination of an academic exercise of relevance for my professional career, but also a transcendental part of my life. That said, this journey could not have happened without the intervention, assistance, help, professionalism, and friendship of my dear professor, Dr. Marcos Machado — or as I call him with utmost respect, Maestro. This life-changing experience was also possible thanks to other important and wonderful human beings. In this realm, I would like to mention Dr. Jay Dean, Dr. Kimberley Davis, Dr. Richard Perry, and Dr. Michael Miles for their limitless support. Like Machado, they were by my side every inch in this rite of passage. Last, but not the least, I would like to acknowledge my committee, Machado, Dr. Nicholas Ciraldo, Dr. Christopher Goertzen, Dr. Stephen Redfield, and Dr. Douglas Rust; I must say, I was really lucky and privileged to study, work, and share a learning experience at The University of Southern Mississippi with scholars of such academic wisdom and passion; for all of them I would like to say thank you and let you know that you pulled the best out of me.

DEDICATION

With love and passion to my family, friends, and colleagues — without them this work would not be possible nor would have a reason to exist.

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CHAPTER I - THE PEDAGOGICAL BACKGROUND OF TAO OF BASS & METHODOLOGY

- a. Brief biography and introduction to Dr. Marcos Machado's teaching philosophy.

Machado defines his mindset as non-dogmatic regarding his musicianship and teaching abilities. His motivation has been strongly driven by curiosity when approaching a musical instrument or any other musical or cultural activity. This idea was given to him by his father, who introduced him to music at an early age.

Machado began to play double bass in the late 1980s. Before the double bass, he also studied classic guitar, electric bass, and clarinet. His first double bass teacher was Professor Milton Romay Masciadri, an Uruguayan, who taught and performed in Porto Alegre, Brazil. He introduced Machado to recordings of some of the all-time great double bass performers, including François Rabbath, Francesco Petracchi, and Ludwig Streicher, for the first time.

Later in his life, Machado's mindset was heavily influenced by the philosophies of martial arts, which led him to professionally practice Gung Fu (Bruce Lee preferred the Chinese spelling to the one used in the US).¹ During this time, he was introduced to Jeet Kune Do, a modern martial art, created by Lee. Machado's curiosity and non-dogmatic approach to life matched with the ideals of Lee, Lao-Tse, and Confucius, who were philosophers in the realm of martial arts. Moreover, these non-dogmatic and scientific philosophies contributed to Machados's double bass learning approach.

¹ Bruce Lee. *Chinese gung fu: the philosophical art of self-defense*. (Burbank, Calif.): Black Belt Books, 1888.

After his contact with martial arts philosophies, Machado was introduced to Ken Wilber and the philosophies he expressed in his *Integral Theory*. Wilber's work influenced Machados's approach to learn and apply knowledge in a cumulative way instead of a single layer-style approach. Consequently, Machado's initial non-dogmatic approach was fueled by Wilber's philosophies in such a way that he describes his learning process and technical approach as a layered one. In other words, it is an integral approach because it nurtures from different double bass schools but applies holistically to any musical situation. Furthermore, Machado's goal since he began playing double bass was to commit to learn and perform from an "open" mindset in this regard.

b. The pedagogical background of *Tao of Bass*.

With these ideas in his mind, Machado published *Tao of Bass Vol.1* in 2016, which he describes as a compilation of left-hand technique exercises. Actually, his original idea related to his past as a student carrying a bulk of books, which he decided to compile into a collection after a meticulous selection.

That said, these selected and adapted exercises in *Tao of Bass Volume 1* are split into three chapters. The first chapter relates to "traditional positions" (such as the position systems of Franz Simandl or Isaia Billé) and explores left-hand techniques in the lower register of the double bass. The second chapter explores mainly the four-finger technique linked with the pivot technique. Although Rabbath advocates for the use of the pivot technique, he limits its use to the fingering pattern: index, major, and pinky; whereas Machado applies the pivot technique to any fingering pattern permutation and includes all five fingers. The combination of what Machado learned about pivot technique with Rabbath, alongside his fingering pattern permutation philosophy, is what he calls a

layered approach in his technical performance skills (also related to Wilber's philosophies). Finally, in the third chapter of *Tao of Bass*, Machado explored extensively the possibilities of the thumb positions.

In *Tao of Bass*, Machado presented his selection of technical exercises in a progressive learning curve. The three chapters begin by establishing the basic position permutations with a very simple rhythm pattern (Fig. 1). From this point, Machado explores the possibilities of these basic positions in conjunction with a variety of left-hand techniques. This progression arrangement is meant to train the bassist to assimilate a wide range of fingering pattern permutations in an extensive variety of melodic arrangements. His vision is to recognize these patterns in the double bass repertoire and apply them almost as if in an unconscious state of mind. In his own words, he claims that one can "train [one's] body to react really fast".²

² Marcos Machado, "Integral Technique" (video of lecture, Discover Double Bass) November, 2019, accessed January 15, 2021, <https://courses.discoverdoublebass.com/courses/635317/lectures/11472278>.

Exercise 2.1 The Basic Positions

Figure 1. Tao of Bass. An excerpt from the Basic Positions permutations in a very simple rhythm pattern, p. 74.

When studying *Tao of Bass* Machado's expectations are that the bassist masters' left-hand techniques to enhance his overall performance. In his mindset, the double bass repertoire is full of challenges, but for him, one of the principal issues is to achieve clarity in articulation and mastering these left-hand techniques to resolve this issue. This is especially meaningful if the bassist is playing in an orchestra setting and wants to develop the same proficiency in articulation as the rest of the violin family. Machado's approach to technical exercises is heavily influenced by the great violin virtuoso Jascha Heifetz. Machado was aware that Heifetz used to practice pure technical exercises as the core of his practice sessions. Consequently, Machado's admiration towards Heifetz made him aware that to achieve a level of proficiency equal to his, one must constantly practice technical material to maintain and develop the highest potential of oneself in every aspect of one's musicianship. In his own words, "technique is the vehicle to musicality".

Another aspect of Machado's mindset regarding the way the bassist approaches the *Tao of Bass* is to be honest with oneself. This means to choose the exercises that suit one best, and to leave behind those which do not fit one's interests and/or needs. That is why *Tao of Bass* contains so many examples because its non-dogmatic concept is meant to reach the different needs of the bass community. That said, it contributes a wide range of left-hand technical exercises from which the bassist can choose. I like to think that *Tao of Bass* is a sort of dictionary because it has a vast content of left-hand technical approaches, but usually one uses it to find a handful of "words" during a study session. When selecting an exercise from *Tao of Bass*, the bassist needs to choose the exercises that best suit the intentions of his practice sessions.

Regarding the inclusion of *Tao of Bass* in the learning process of the bassist, Machado thinks that teachers should expose students to other technical solutions rather than adopting a single approach throughout the learning process.

c. Methodology

The methodology of this dissertation will set a pedagogic frame in which *Tao of Bass* plays the core part in preparing left-hand technique issues found in the symphonic and solo repertoire for professional double bass performance settings (auditions, competitions, recitals, admissions, etc.). Therefore, I selected a repertoire focused on preparing for these professional settings, which is based on the statistics found by David Sickle's article in *Bass World* magazine (Fig. 2 - 3). The article is a survey of double bass audition repertoire, taken from professional North American and European orchestras.

The results are helpful, though predictable, as the excerpts drawn from the survey follow the traditional symphonic and solo double bass repertoire.³

Based on Sickle's survey I selected twenty orchestral excerpts and five solo excerpts of the most requested audition pieces by orchestras. Then, I applied the left-hand techniques featured in *Tao of Bass* according to the musical needs of each excerpt. Most of the time the applications are based on musical premises. However, at times the performer/teacher needs to consider both physical comfort and the best musical option. *Tao of Bass* contains numerous examples of how to perform the same musical idea with different left-hand technical approaches. This feature of *Tao of Bass* is helpful to find a balance between physical comfort and the best musical option whenever we are in this dilemma. For this reason, I dedicate the entire second chapter of my dissertation to exploring and mapping *Tao of Bass*, proving its value as an aid to master left-hand techniques.

³ David M. Sickle, "Orchestra Audition Report." *International Society of Bassists*, 16, no. 2. (Winter, 1890): p. 47-49.

REPERTOIRE LISTS

NORTH AMERICAN ORCHESTRAS

<i>Excerpt</i>	<i>Times Requested</i>
Beethoven: Symphony 9	36
Beethoven: Symphony 5	32
Strauss: <i>Ein Heldenleben</i>	26
Mozart: Symphony 40	21
Strauss: <i>Don Juan</i>	17
Verdi: <i>Othello</i>	17
Mahler: Symphony 1	16
Mozart: Symphony 35	15
Britten: <i>Young People's Guide to the Orchestra</i>	14
Brahms: Symphony 1	13
Brahms: Symphony 2	12
Prokofiev: <i>Lt. Kije</i>	12
Stravinsky: <i>Pulcinella</i>	12
Shostakovich: Symphony 5	10
Mozart: Symphony 39	10
Ginastera: <i>Variaciones Concertante</i>	10
Beethoven: Symphony 7	9
Tchaikovsky: Symphony 4	9
Mahler: Symphony 2	9

Figure 2. Selection from Mr. Sickle's survey of required orchestral repertoire in professional double bass auditions in North America.

<i>Required Solo</i>	<i>Times Requested</i>
Solo of Choice	34
Bach: any Cello Suite	9
Bach: Bourees from Cello Suite 3	5
Bottesini: Concerto in B	5
Vanhal: Concerto	4
Koussevitzky: Concerto	4
Dittersdorf: Concerto	3

Figure 3. Selection from Mr. Sickle's survey of required solo repertoire in professional double bass auditions in North America.

The main goal of this dissertation is to ignite our awareness on when, where, and why a bassist should apply the *Tao of Bass* left-hand techniques. I will discuss each left-hand technique found in *Tao of Bass* while applying these to the selected repertoire.

Although *Tao of Bass* explains these techniques for the purpose of context and study, I

decided to discuss the techniques prior to their application in the repertoire. The criteria for the application will be discussed after a brief musical analysis of the excerpt. This will be done to tailor to the performer's technical skills and suit their musical needs.

In the third chapter, as part of my conclusions, I will analyze other pedagogues' left-hand technical solutions to a musical challenge and compare these with Machado's approach in *Tao of Bass*. When comparing these techniques, I am encouraging the professional bassist to develop awareness about how many of these techniques coexist in *Tao of Bass*, and why and when to apply these. Moreover, these comparisons will enlarge a gamut of approaches that a double bass performer can access when resolving a technical issue in an unfamiliar musical passage.

Also, my dissertation supports the idea that *Tao of Bass* constitutes a pedagogical frame with the capacity of developing a wide range of strategies to learn and teach a new approach to the challenges of the left-hand technique present in the professional career of a bassist. Moreover, this approach found in *Tao of Bass* does not respond to doctrines; instead, it focuses on finding a balance between musical aspects and left-hand technical challenges without compromising the performer's musical ideas. I believe that *Tao of Bass* embraces a vast spectrum of technical approaches for the left hand; consequently, *Tao of Bass* is a pedagogic tool that has the flexibility to adapt to any left-hand technique challenge presented in a bassist's professional career.

CHAPTER II – APPLICATIONS OF THE LEFT-HAND TECHNIQUES FOUND IN TAO OF BASS

Introduction

This chapter is dedicated to discussing the application of the technical principles and aspects for the left-hand techniques found in *Tao of Bass Volume 1*. I extracted all the techniques found in *Tao of Bass* (Fig. 4) and related each one with orchestral and solo excerpts found in audition repertoires for professional double bassists. Particularly relevant to this discussion is the application of these techniques in the repertoire I selected from the Sickle audition survey discussed in chapter one. Furthermore, the order of the appearance of the techniques is purely alphabetical, and it does not respond to a particular pedagogic plan or progression. This is because the application of the techniques and the quality of each are the focus of this chapter.

Techniques in *Tao of Bass*

a. Anticipation
b. Bridge
c. Crab
d. Fan
e. Finger substitution
f. Fork
g. Four-finger technique
h. Pivot

Figure 4. Techniques found in Tao of Bass.

a. Anticipation

The anticipation technique is a way to move within positions without shifting. The positions involved have a common tone which represents in terms of fingering a pivot finger. Such a quality works toward the creation of a strong intonation reference and simultaneously allows one to move with ease within the two positions. This technique, when applicable, avoids interruptions in the motion of the left hand; in other words, it allows for a seamless transition between notes. Machado describes this technique as a crawling motion similar to the “Crab” technique, but with a fingering pattern adapted to the neck positions.⁴ Therefore, the application of this technique helps the performer master legato articulation. For instance, in order to play a passage from Beethoven’s *Scherzo* in legato, we could use the anticipation technique.



Musical example No. 1. Beethoven. Symphony No. 5, III mvt. Scherzo, mm. 4-9.

Musical example no. 1 is a selection from the Scherzo of Ludwig van Beethoven’s 5th Symphony, which is one of the most requested pieces in auditions.⁵ Apart from the fact that it is one of the most played symphonies in auditoriums around the world, it also represents a technical challenge for the double bass section.

⁴ Marcos Machado, *Tao of Bass*, vol. 1, *The left hand*. (U.S.: 2016): p.102, 138.

⁵ David M. Sickle, “Orchestra Audition Report.” *International Society of Bassists*, 16, no. 2. (Winter, 1890): p. 47-49.

Beethoven was an innovator regarding orchestration techniques. He had expansive ideas on the overall genre, which led him to introduce significant changes in every aspect of the symphony.⁶ An important change was the melodic treatment of the lower pitch range instruments. For this reason, Beethoven expanded the range of pitch for those instruments in his orchestrations. Moreover, Beethoven gave principal roles to bass instruments, an unfamiliar practice in the 18th century. As a result, many times in his symphonic output the bass voice has the principal melody, and musical example no.1 is a good example of this feature.⁷

The C minor arpeggio in second inversion covers a wide range of pitch throughout the fingerboard. This represents a challenge for the left-hand motion. The double bassist technical skills are exposed, and any interference in the performance could impact the quality of intonation and/or the legato articulation. Additionally, the excerpt involves a sequence of string-crossing motions, which requires a proficient coordinated action of right and left arms from the performer.

Because of the nuances this music demands, the anticipation technique can be a valuable aid to master intonation and legato articulation in musical example no. 1. In chapter two of *Tao of Bass*, the anticipation technique is presented in a set of exercises depicting the possible scenarios to use this technique. I selected six of these to depict some of the possibilities of this technique. In figures 5 to 8, the examples describe the different intervallic motions and pitch range of the technique.

⁶ Stedman, Preston. *The Symphony*. (New Jersey: Prentice-Hall, 1879): p. 63

⁷ Ibid. p.63



Figure 5. *Tao of Bass, Ex. 2.69, anticipation technique, descending motion, p. 102.*



Figure 6. *Tao of Bass, anticipation technique, ascending motion, p. 102.*



Figure 7. *Tao of Bass, anticipation technique, descending motion with a string crossing, p. 103.*



Figure 8. *Tao of Bass, anticipation technique, ascending motion with a string crossing, p. 104.*

The fingering pattern of Fig. 9 is the motion that we need to apply when fingering Beethoven's *Scherzo* in the manner of Fig. 10 (the anticipation motion is marked in parenthesis). The outcome is that once we secure the fourth finger in G at mm. 4, we have placed the left hand in a position that connects the rest of the pitches (C and G) within the musical phrase in the same position. For this reason, the anticipation technique works to

perform an accurate intonation. Moreover, once the left hand is in a fixed position, it promotes stability in the left arm for the bow to cross strings in a seamless motion. In this way, the anticipation technique also helps perform the excerpt with legato articulation throughout the phrasing slur of music example no.1.



Figure 9. *Tao of Bass, anticipation motion descending, same finger pattern for musical example no. 1 mm. 3-8. p. 103.*

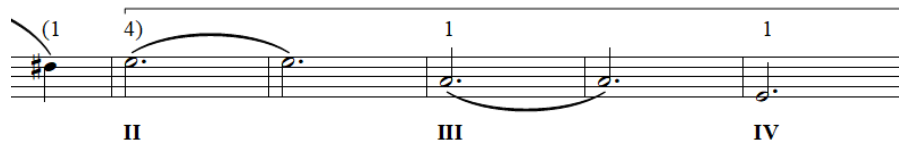


Figure 10. *Tao of Bass application, anticipation technique; Beethoven, Symphony No. 9, IV mvt., mm. 3-7.*

Another scenario in which we could apply this technique is in Beethoven’s 7th Symphony. The final cadenza to repeat the development in the first movement is known as a bass countermelody, which enhances the contrapuntal texture and indicates a punctuation in the dominant (E).⁸ This passage contains a leap of a minor sixth that must be played at fast tempo; Beethoven indicated the dotted quarter equals 104 bpm.



Musical Example No. 2. Beethoven, Symphony No. 7, I mvt. Vivace, mm. 169-170.

⁸ Stedman, Preston. *The Symphony*. (New Jersey: Prentice-Hall, 1879): p. 79

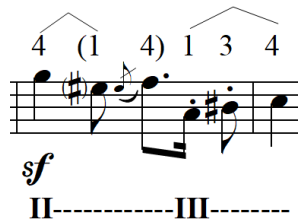


Figure 11. *Tao of Bass* application, anticipation ascending to prepare the descending minor sixth leap.



Figure 12. *Tao of Bass*, anticipation motion descending a minor third, similar finger pattern for musical example no. 2 mm. 169-170. p.103.

The anticipation technique in musical example no. 2 helps perform this leap with proficient dexterity. The contraction of the left hand while performing the anticipation technique helps to bring a sense of impulse and serves as an intonation reference as one moves from A to C#. In a way, the same principles discussed in the previous example apply to this one, too. The difference is that instead of arriving at the next pitch in a fixed position, one arrives performing a downward minor third with a pivot motion (the pivot technique is discussed later in this chapter), as indicated in Fig. 11 with a bent line. The *Tao of Bass* example cited in Fig. 8 prepares this sort of intervallic leap. Although the example does not cross strings like in musical example no. 2, its purpose is clear: It prepares a downward motion using the anticipation technique instead of a traditional shift to move within positions.

The last example is from the traditional double bass solo repertoire: the Karl Ditters von Dittersdorf *Concerto in Eb* (trans. to D). In the first movement of the concerto

there is a transition in cantabile style that modulates to a closely related key, F# minor. Within this section one can apply the anticipation technique. From mm. 69 to 71, the anticipation technique can be used twice to help the performer cross strings without shifting. It also helps the performer anticipate the next pitch while securing the left hand in a new position with only one shift, avoiding a break in legato caused by disjointed shifting.



Musical Example No. 3. Dittersdorf Concerto in Eb (transported to D), I mvt Allegro moderato, I mm. 79-80.

The first time we apply the anticipation technique (Fig. 13) in music example no. 3, one can observe that the anticipated pitch is A# (which requires an upward motion). Once this is established, the performer can perform a pivot and reach the major third easily. Consequently, the F# lies in a parallel fingering in the first string, which makes this a shift-less and effortless string change. The second time we apply the anticipation technique the downward motion anticipates the next position in order to secure intonation in the octave leap.

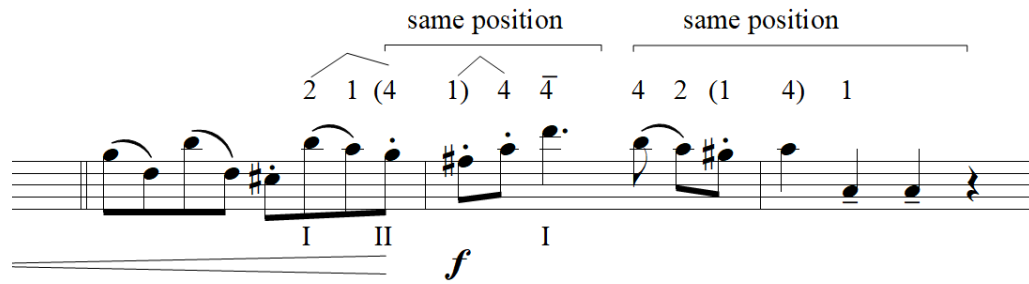


Figure 13. *Tao of Bass application, anticipation technique (marked in parenthesis).*

In *Tao of Bass*, Machado includes a couple of examples that work the same anticipated interval and position (Fig. 14-15). In the first application, where one prepares the ascending minor third leap, we can prepare this technical gesture with exercise no. 2.69 n. The second time one can practice variation “c” of the same exercise.



Figure 14. *Tao of Bass, anticipation motion ascending a minor third, which is the same finger pattern for musical example no. 3 mm. 79-80, p.103.*



Figure 15. *Tao of Bass, anticipation motion descending to prepare the octave leap mm. 79-80, p.103.*

In conclusion, the anticipation technique is useful to secure intonation and to create a seamless sound while shifting, especially in legato passages.⁹ This aid is critical in the excerpts discussed previously. The reason for its importance is that the technical timing must anticipate the musical timing to prepare a coordinated motion between both the arms and the musical timing.¹⁰

⁹ Marcos Machado, *Tao of Bass, vol. 1, The left hand.* (U.S.: 2016): p.102

¹⁰ Ivan Galamian, *Principles of Violin Playing and Teaching.* (Dover edition. New York, 2013): p. 21-23

b. Bridge

Bridge, “or barred fingering is the technique of pressing down two strings with the same finger”.¹¹ This technique can be used in a variety of instances, either harmonically to perform double stops of a perfect fourth or melodically when the excerpt contains a leap of a perfect fourth. Another reason to understand the importance of the bridge technique is the tuning of the double bass in fourths. This tuning makes it possible to produce a perfect fourth when using the barred finger or bridge technique. This logic makes the bridge technique a significant resource for double bass compositions. Its shape allows the performer to instantly access two pitches fairly in tune at once.

For these reasons, the bridge technique is a great resource when we must perform a double stop formed by an interval of a perfect fourth at fast tempos. Also, when applicable, this technique helps the string crossing motion, intonation, and articulation at fast tempos. String crossing is facilitated when we play the bridge technique; when pressing two strings simultaneously, the string action of both strings is even or balanced. This balance allows the bow to cross the strings seamlessly, allowing the musician to constantly anticipate the musical time.



Musical Example No. 4. Mozart’s, Symphony No. 40, Molto Allegro I mm. 183-5.

A clear example of the application of the bridge technique in fast tempo passages is Symphony No. 40 by Wolfgang Amadeus Mozart. In this example we find a common compositional technique, used often during the Classical era, where the bass outlines the

¹¹ Marcos Machado, *Tao of Bass, Vol. 1, The left hand*. (U.S.: 2016): p.16

harmony. This technique is similar to the Alberti bass (broken triads) or the murky bass (octaves). Both compositional techniques were widely used over the Classical period. Composers had an appeal for this type of bass accompaniment because of its symmetry and pitch content; it allowed composers to outline the harmony while providing a strong rhythmic pattern for the sake of the homophonic texture of the music.¹² Although this is not an Alberti bass in its pure form because it lacks a third pitch, perhaps Mozart orchestrated the Alberti bass, adding the missing pitch in other voices on the score. Also, this bass-like pattern allowed him to create the characteristic homophonic texture found often in the Classical period.

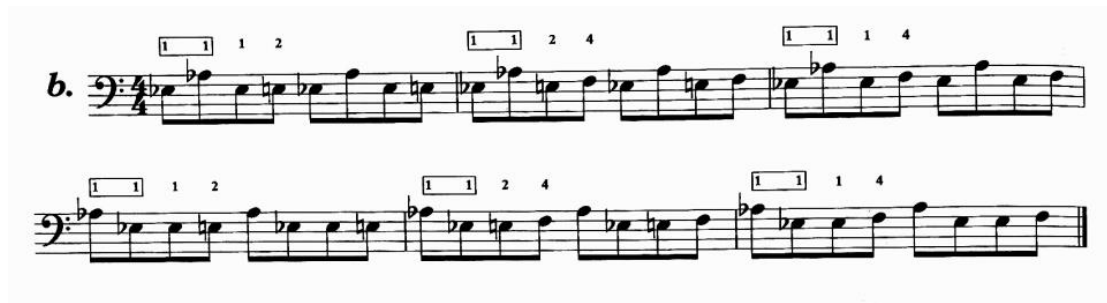


Figure 16. *Tao of Bass*, Ex. 1.11 b bridge technique, double stops, p.16.

Figure 16 is an example from *Tao of Bass* that is meant to work the independence of the left-hand fingers while performing the bridge technique. The idea is to maintain the bridge technique while alternating pitches within a particular position, in Fig. 16 the half-position (as in Simandl).

This kind of exercise can aid the performer to solve passages like musical example no. 4. First, they are meant to strengthen the performer's endurance; patterns like those found in music example no. 4 are all over Mozart's symphonic and operatic

¹² Craig M. Wright and Bryan R. Simms. *Music in Western Civilization*. (Belmont, CA: Thomson/Schirmer, 2006): p. 386.

repertoire. Second, the melodic patterns in *Tao of Bass* bridge technique exercises were designed based on the repertoire. When we compare the fourth or last measure of Fig. 16 to the first and second measures of musical example no. 4, we observe that the position of the left hand and the pitch set is equal, which makes the technique accessible and easy to apply (Fig. 17). Last, because of its barring concept, this technique is useful when performing at fast tempos; by having two pitches accessible at once, this simplifies coordination issues between both arms.

Same position (7th position Simandl, 3rd position Rabbath)

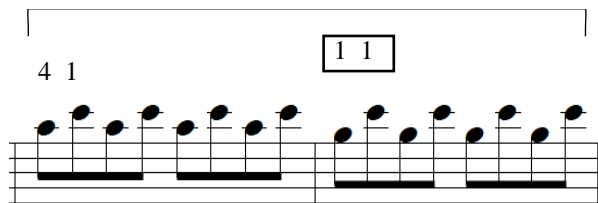


Figure 17. *Tao of Bass* application, bridge technique, Mozart, *Symphony No. 40, Molto Allegro I* mm. 183-4.



Musical Example No. 5. Johannes Brahms, *Symphony No. 2, IV mvt Allegro con spirito* mm.258.

In music example no. 5, we find another melody where we could apply the bridge technique. Compared to music example no. 4, this melody is not a tonal sequence; it is a scalar bass line outlining a harmonic sequence. Furthermore, the first measure of music

example no. 5 outlines a harmony around an A major chord in first inversion. Therefore, it contains a perfect fourth, making it suitable to apply the bridge technique.

Another reason to apply bridge technique is again related to fast tempos. To flawlessly articulate every note in the context of musical example no. 5 is a challenge because Brahms' music is multidimensional in its detail. Therefore, the technical aspects should not be an issue. Simplifying technical issues without compromising the quality of the musical outcome is an important part of making art as a performer. Music example no. 5 is a good example because its nature requires all these details to be solved, and the bridge technique plays a significant part in the solution of these excerpts.

The figure shows a musical staff in bass clef with a key signature of two sharps (F# and C#) and a 4/4 time signature. The melody consists of two measures. The first measure contains the notes G2, A2, B2, C3, D3, E3, F#3, G3. The second measure contains the notes G3, F#3, E3, D3, C3, B2, A2, G2. Above the staff, fingerings are indicated: '1' for the first note, '4' for the second and third notes, '2' for the fourth note, '4' for the fifth note, '1' for the first note of the second measure, '3' for the second, '2' for the third, '1' for the fourth, '4' for the fifth, '3' for the sixth, '1' for the seventh, and '4' for the eighth. A box highlights the first four notes of the first measure. A horizontal line with a small upward-pointing triangle above it spans the first four notes. Another similar line spans the last four notes of the second measure. Below the staff, the bridge technique is indicated with dashed lines and Roman numerals: 'III----- II-I-----' for the first measure and 'II-----III' for the second measure.

Figure 18. *Tao of Bass application, bridge technique, Brahms, Symphony No. 2, IV mvt., mm.: 258-59.*

The application of the bridge technique in Fig. 18 makes it possible to play these two measures without shifting. It will not only improve the legato articulation, but it will also balance the tone color, especially important in a pianissimo passage. Finally, I mentioned that the bridge technique was a part of the solution I found based on Machado's technical approach. I must insist that this technique is not an isolated solution; most of the time the solutions to these challenges are in the combination or interaction of two or more techniques. In this example, I also used the pivot technique and the four-finger technique, also part of Machado's technical approach. The interaction of these

techniques helped me achieve a shiftless section that not only enhances the musical outcome but resulted in an effortless and simple act of coordination and motion of the arms.

Because the pinky finger is naturally the weakest, it is important to work to develop its strength with particular attention. In *Tao of Bass*, the fourth finger is treated as equally important as the rest of the left-hand fingers. One of the fundamental aspects of Machado's mindset is that a note can be played by any finger no matter the position, as long as the musical outcome profits from it. In Fig. 19, it is possible to appreciate that each finger performs the bridge technique crossing three strings. Although it is rather unusual to find an example in a double bass repertoire, this exercise is focused on gaining strength in the left hand to perform the bridge technique. Also, it explores the physical boundaries of the bassist technique, limited by the proportions of the human hand and the oversized double bass fingerboard.

Moreover, since the passage in musical example no. 5 is pianissimo, we must press the string with a stronger grip to keep a seamless sound. Therefore, strengthening our left-hand muscles should be part of our practice. An exercise as in Fig. 19 is ideal to assess our strength and establish a goal to build up left-hand strength to perform passages like music example no. 5 at our best.

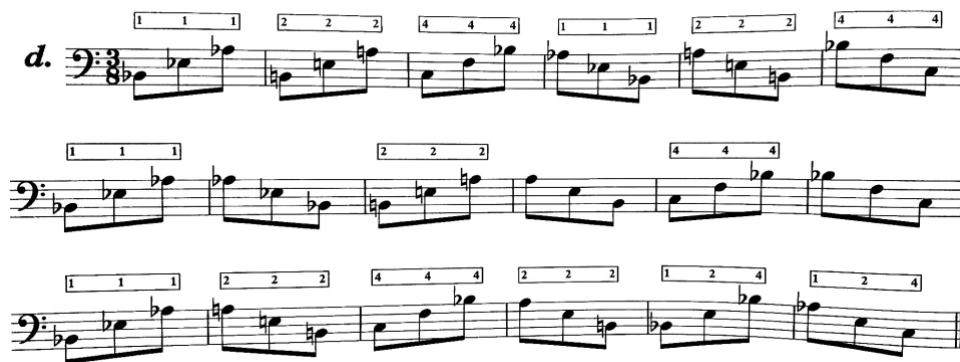


Figure 19. *Tao of Bass*, Ex. 1.11 d, bridge technique, p. 16.

Finally, an example from double bass solo literature, the K.D. v. Dittersdorf *Concerto in Eb* (trans. to D). The excerpt I am going to discuss belongs to the third movement, *Finale Allegro*. The introduction starts with a flamboyant tonal sequence written in double stops, in which the bridge technique is applicable.



Musical Example No. 6. Dittersdorf, *Concerto in Eb* (trans. to D), III mvt. Allegro, mm. 1-4.

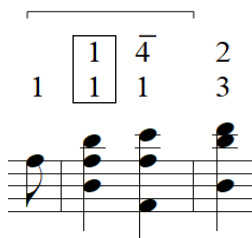


Figure 20. *Tao of Bass* application, bridge technique, Dittersdorf, *Concerto in Eb* (trans. to D), III mvt. mm. 33-5.

The application of the bridge technique in Fig. 20 is almost intuitive. The interval of the perfect fourth in the downbeat and the ascending tonal progression after proving that the bridge technique could be effective if applied. Also, when we have these sorts of passages, we need to think like a guitar or a piano player. This means we must have in our muscle memory the different shapes of a double stop available in our mindset to anticipate the musical time. These shapes, formed while performing double stops, follow one of the principles of a chord progression while shifting, which is to maintain the shared tone through the progression. In matters of left-hand shape, many times the shared tone implies when a shift is necessary and when not. For instance, in music example no. 6, the shared tone is the A, which means we could play the first measure without shifting. This is because D and E in the soprano voice are available while holding the A. This type of behavior in tonal progressions is explored in *Tao of Bass* through many exercises dedicated to building a strong sense of all the left-hand shapes. Also, the exercises work when shifting into a different shape or to repeat the shape (because there is not a shared tone). In Fig. 21, the bridge technique exercise is combined with the four-finger technique, but the drill of performing each of the possible combinations with a pedal tone (the shared tone) is more important. This sort of practice engraves in our muscle memory the double stop shapes necessary to perform any passage in double bass repertoire involving double stops.

Exercise 2.28



Figure 21. *Tao of Bass*, Ex. 2.28 bridge technique, double stops, p.88

In conclusion, the bridge technique can simplify an excerpt by minimizing shifts, improving intonation clarity, producing accurate articulation at fast tempos, and solving coordination issues. One could say that this technique is a response to the idioms of the instrument regarding its tuning in perfect fourths. For the reasons mentioned before, the bridge technique is especially useful in tonal sequences when either written in the form of double stops or in melodic contexts.

c. Crab

In chapter III of *Tao of Bass*, the crab technique is introduced by Machado as an anticipation technique.¹³ This anticipation aspect of the crab technique is closely related to the anticipation technique previously described in this chapter. The purpose of this technique is to aid the performer in neck and thumb positions regarding intonation, articulating in legato, and displacing with ease through the fingerboard by anticipating the next pitch (ascending or descending).

An important feature of the crab technique is that the left-hand fingers never release the pressure applied to the string. Consequently, the performer benefits from this feature because it allows one to produce a seamless stream of sound, an elemental tool to perform legato articulation. The equal pressure performed when applying the crab technique allows the point of contact of the bow with the string to remain equal in terms of string action. In other words, the string does not change its action abruptly; instead, it transitions smoothly. However, if one releases the pressure completely while shifting, the string will react as a spring, compromising the stability of the point of contact of the bow with the string.

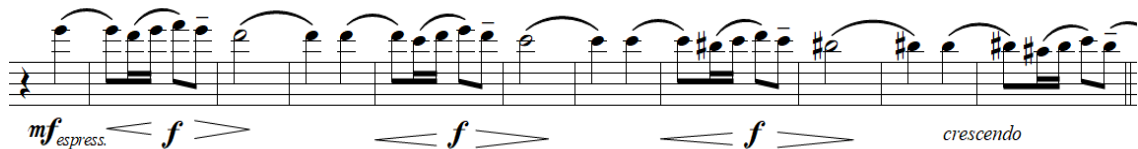
Moreover, Professor François Rabbath named this technique after its similarities to the motion of a crab.¹⁴ In his method, he highlights its application benefits for the arms by means of motion stability in the left hand and balance on the bow to perform legato

¹³ Marcos Machado, *Tao of Bass, Vol. 1, The left hand*. (U.S.: 2016): p. 138.

¹⁴ Marcos Machado. "Francois Rabbath Applied: An Analysis of his Technique for a Successful Performance of Frank Proto's Music." DMA diss., University of Illinois, 2005. Accessed April 12, 2017. <http://search.proquest.com lynx.lib.usm.edu/docview/305000930> p.30-31.

articulation.¹⁵ Therefore, the application of the crab technique is extremely useful when resolving musical challenges in which the legato articulation is a prominent characteristic.

For instance, in *The Young Person's Guide to the Orchestra* (Var. H) by Benjamin Britten, the double basses have a soli involving a melodic passage in legato articulation. From measures 230 to 230 of Britten's example, the stepwise motion melody has a descending pattern within. This sort of passage is ideal to apply the crab technique, since the seamless motion of the crab technique aids the performer in anticipating the next pattern without shifting. This results in a stream of sound without bumps or distortions.



Musical Example No. 7. Britten, *The Young Person's Guide to the Orchestra* Var. H, mm. 230-230.

In *Tao of Bass*, we find the crab technique in the third chapter of the book, which is entirely dedicated to the study of thumb positions and the related left-hand techniques. Moreover, the crab technique as mentioned before can be applied in thumb and neck positions. However, its application is focused on thumb positions because the positioning of the left hand in this technique leaves the left thumb lying on the fingerboard instead in the back of the neck. One can apply the crab technique in the lower positions, but as we

¹⁵ François Rabbath. *Nouvelle Technique de La Contrebasse : Méthode Complète et Progressive, Cahier 3*. (France: Alphonse Leduc, 1877): p.91.

descend to lowest positions it is best to switch to a different anticipation technique for the sake of the left arm posture.

In music example no. 7, we have a descending stepwise melody. This melodic passage encloses a melodic pattern within (Fig. 22) that is repeated and transposed during the excerpt. Like a variety of examples and etudes in *Tao of Bass*, the sequential patterns in a melody can be seen as fingering patterns, too. In melodic contexts similar to the example, we can typically apply a fingering that has a repeated structure — in other words, a fingering pattern. In music example no. 7, the pattern pitch range is a minor third which is the equivalent of a chromatic position.¹⁶ Therefore, we can apply a chromatic position throughout the excerpt as Fig. 22 describes. Once identified, one must connect these melodic patterns (Fig. 22). Therefore, the crab technique application aids the performer when connecting and moving through the different transpositions of the fingering pattern without shifting.

The figure shows a musical staff with three melodic patterns labeled 'Melodic pattern 1a', 'Melodic pattern 1b', and 'Melodic pattern 1a'. Above the staff, fingering patterns are indicated: '1 + 1 (3) 2 1' for the first and third patterns, and '2 + 2 3 (2) 1' for the second pattern. The notes are connected by slurs, and some are circled. Below the staff, dynamic markings include *mf* *espress.*, *f*, and *crescendo*. A box labeled 'major second' has arrows pointing to the interval between the second and third notes of the first pattern and the interval between the second and third notes of the second pattern.

Figure 22. *Tao of Bass* application, crab technique; Britten, *The Young Person's Guide to the Orchestra* Var. H, mm. 230-230.

¹⁶ Francesco Petracchi. *Simplified Higher Technique for Double Bass*. (London, England: Yorke Editions, 1882): p. 1.

Observe in Fig. 22 how the application of the crab technique always secures the major second interval. Here, the crab technique score nomenclature is a circle over the pivot finger. The pivot finger does not move until the next pitch is secured.¹⁷

Tao of Bass exercise 3.64 (Fig. 23) works with a similar pattern to music example no. 7. First, the exercise works a descending motion in crab technique. Second, the example uses a similar finger pattern in which the third finger secures the major second, as in Britten's example.

Exercise 3.64

Figure 23. *Tao of Bass*, Ex. 3.64, crab technique, p.160.

The next application is an excerpt of Serge Koussevitzky's double bass *Concerto in F# minor* (trans. to E minor). In music example no. 8, the crab technique enables the performer to secure intonation in the minor third between B and D when pivoting with the first finger (Fig. 24). Moreover, in contrast to musical example no. 7, the crab technique applied in Koussevitzky's example anticipates an ascending motion. The awareness of the performer about the direction of the crab technique — ascending or descending — is crucial to understand the behavior of the left-hand motion. In a descending interval the left hand expands downwards and then contracts upwards while pivoting, whereas for an ascending interval the left-hand contracts and expands

¹⁷ François Rabbath. *Nouvelle Technique de La Contrebasse: Méthode Complète et Progressive, Cahier 3*. (France: Alphonse Leduc, 1877) : p.92.

downwards. Therefore, when the crab technique is applied to music example no. 8, the left-hand contracts by playing the half step between C and B with fingers 3 and 1 respectively, and then pivoting with the first finger and reaching D with the third finger. In this way, the crab technique allows the performer to continue applying pressure to the fingerboard, which makes it especially useful in Koussevitzky's music, due to its Romantic use of legato and chromaticism.



Musical Example No. 8. Koussevitzky, Concerto in F# minor (trans. to E minor), I mvt. mm. 17-18.

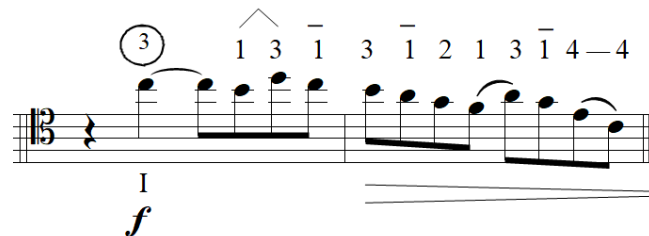


Figure 24. *Tao of Bass* application, crab technique; Koussevitzky, Concerto in F# minor (trans. to E minor), I mvt. mm. 17-18.

To prepare the motion in the application of Fig. 24, the performer can apply exercise no. 3.115 c of *Tao of Bass*. This exercise not only prepares the bassist for the crab technique focusing on a descending motion with the third finger while pivoting, but it also works the same fingering pattern as the application (Fig. 25).

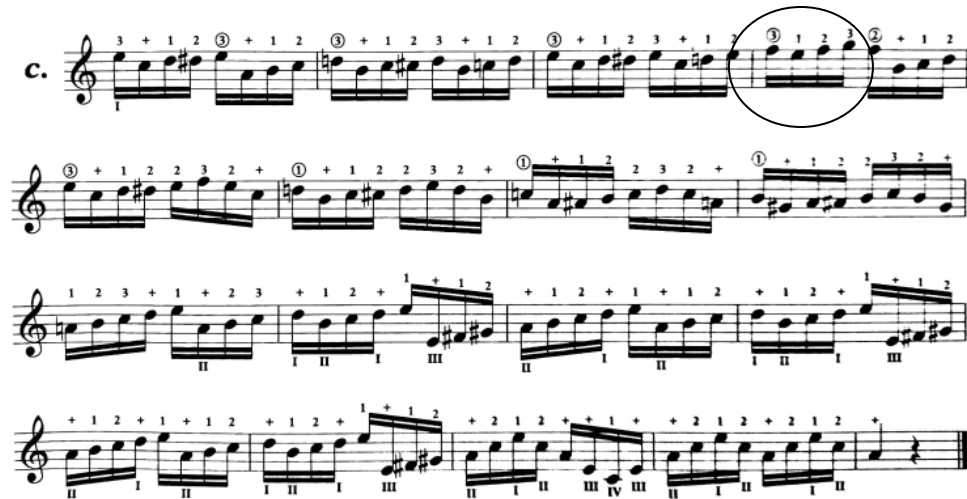


Figure 25. *Tao of Bass*, Ex. 3.115 c, crab technique, p.191.

The next example will discuss an excerpt from Dimitri Shostakovich’s *Symphony No. 5*. This music example explores the thumb position, particularly the fourth position (Rabbath).¹⁸ Shostakovich reserves the principal melody for cellos and double basses, while the rest of the orchestra performs an accompaniment. Because this melody covers a wide range of pitch, the crab technique is particularly useful here, especially since one of the qualities of the crab technique is that “one crab movement can cover two octaves in three strings without shifting or leaving the fingerboard.”¹⁹

¹⁸ François Rabbath. *Nouvelle Technique de La Contrebasse: Méthode Complète et Progressive, Cahier 2*. (France: Alphonse Leduc, 1877): p.9.

¹⁹ Marcos Machado. “*Francois Rabbath Applied: An Analysis of his Technique for a Successful Performance of Frank Proto’s Music.*” DMA diss., University of Illinois, 2005. Accessed April 12, 2017. <http://search.proquest.com lynx.lib.usm.edu/docview/305000930> p.32.



Musical Example No. 9. Shostakovich, Symphony No. 5, I mvt Moderato, Reh. No. 25 to 4 mm. after.

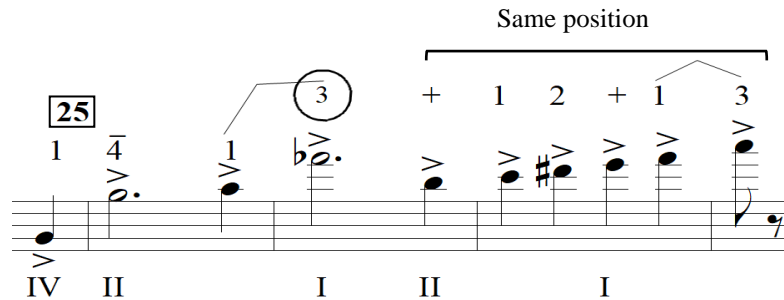


Figure 26. *Tao of Bass* application, crab technique; Shostakovich, Symphony No. 5, I mvt Moderato, Reh. No. 25 to 4 mm. after.

The application of the crab technique in music example no. 9 helps the performer not only cover the descending leap of a diminished fifth but also anticipates the rest of the pitches in the fourth position. Moreover, the crab technique in Fig. 26 deals with a crab motion involving the third finger as the pivot and the thumb as the anticipated pitch. In the third chapter of *Tao of Bass*, the crab technique is explored in a variety of fingering pattern combinations. From those, exercise no. 3.91 (Fig. 27) is closely related to music example no. 9. First, it studies the idea of descending while string crossing by pivoting with the third finger; second, it anticipates the thumb to the next pitch or set of pitches in an adjacent string.

Exercise 3.91 Crab



Figure 27. *Tao of Bass*, Ex. 3.91, crab technique, p.174.

To conclude with the crab technique, one must have in mind four areas where the crab technique is effective. First, while performing this technique one never releases the string pressure, making it helpful to perform legato articulation. Second, the pivots during a crab motion aid one to secure intonation. Third, when a musical passage contains pitch leaps the crab technique can shorten the physical distance between pitches. Finally, while mastering the technique the performer will gain physical flexibility in their left hand, a key condition when playing virtuosic passages of the orchestral and soloistic repertoire for the double bass.

d. Fan

Not all left-hand techniques are frequently applied throughout the repertoire. This is the case with the fan technique, sometimes described as an expressive shift.²⁰ This is because the technique requires the bassist to slide one finger to connect two pitches; the glissando sound which is produced by sliding the finger is the expressive device. Moreover, consistently performing this technique with a glissando sound could result in poor sound production from a bass section. This is because glissando is difficult to match within a bass section. In addition, overusing this musical effect could affect articulation, intonation, and phrase integrity in the music, especially in the orchestral setting. That said, there are other ways of approaching this technique. Machado not only approaches the fan technique like an expressive shift, but he also approaches it as an intonation device. This is because when performing the fan technique, one can anticipate an adjacent position in upward or downward motion depending on the direction of the fan motion. This is especially helpful when dealing with thumb-positions, or the upper pitch range section of the fingerboard, because the space between notes is shorter due to the idiomatic proportions of the double bass fingerboard (a principle which is applicable for all the violin family). Therefore, when sliding to perform the technique, the bassist has to cover less distance, which allows one to avoid glissandos and to arrive faster to the next note. In other words, the technical timing is much more favorable for the technique when applying it in the thumb position area. Moreover, while using the fan technique as an intonation device, the performer must avoid the glissando sound while sliding their left-

²⁰ Orin O'Brien. *Double Bass notebook: ideas, tips, and pointers for the complete professional*. (Carl Fisher: U.S.A. 2016): p. 34-41.

hand finger. During the performance of this technique, one must coordinate the direction of the bow with the fan motion. In this way the glissando sound is masked in the instant that the bow changes direction. By stopping the motion of the bow for that instant, one avoids the glissando sound effect without compromising the sound quality.

The first application of the fan technique will be in the double bass solo found in Sergei Prokofiev's *Lieutenant Kijé Symphonic Suite*. In the second movement of Prokofiev Suite, *Romance*, the double bass has an important solo, one of the few in the symphonic repertoire.

Musical Example No. 10. Prokofiev, *Lieutenant Kijé Symphonic Suite*, II mvt. *Romance*, mm. 3-10.

The folkloric flavor of music example no.10 was Prokofiev's intent to simplify his music and fit his compositional style within the ideals of the Soviet Union.²¹ Regarding its form, the melody of musical example no. 10 has a binary structure: two back-to-back four-bar phrases in modal style using the natural minor mode, G minor, and following the progression i — iv, a common feature in 19th century folk music.²² These

²¹ Preston Stedman. *The Symphony*. New Jersey: (Prentice-Hall, 1979): p.285.

²² Stephen Ivan P. Warble. "An Analysis and Transcription For Symphonic Band Of The Lieutenant Kijé Suite, Op. 60 By Serge Prokofiev" (1969). Masters Theses. 514. Accessed October 15, 2020. <https://thekeep.eiu.edu/cgi/viewcontent.cgi?article=1513&context=theses>. p. 47-50

two phrases are equal in their pitch collection and harmonies, but they contrast in their dynamics. While the first phrase starts in mezzo piano, the second phrase is in mezzo forte, creating a dynamic contrast of soft versus loud. This contrast is a key element to consider to successfully perform Prokofiev’s excerpt.

One can create this sort of dynamic contrast in many different ways. One way is to change fingering patterns and/or left-hand techniques for each four-bar phrase. In the case of musical example no.10, the performer can apply the fan technique in two different ways. The first application of the fan technique, found in mm. 3-6, is focused on keeping the left hand in the same position (Fig. 28). Avoiding excessive motion in the left hand helps one to limit distortions in sound and distractions from an unbalanced posture, which is beneficial for subtle dynamics. In addition, fan motion will allow one to correlate the written slurs with a binary fingering grouping while securing the intonation. This is because the fan motion enables the possibility of performing the entire first section in the fourth position (Rabbath).

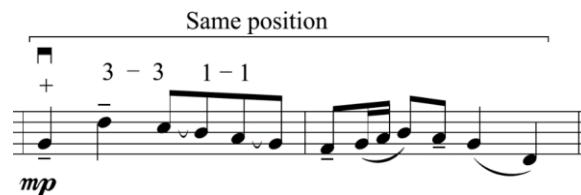


Figure 28. Application of the fan technique, Prokofiev, *Lieutenant Kijé Symphonic Suite*, II mvt. *Romance*, mm. 3-4.

For the second part of music example no. 10, we could apply the fan motion in the fashion of an “expressive shift,” which would create a louder dynamic not by adding pressure and/or more speed to the bow, but by performing the glissando effect of an expressive shift. I selected three spots in the excerpt where one can apply the fan

technique in this fashion. The first and second time I applied the technique is at the beginning and in the middle of the second phrase (Fig. 29). Both spots are important because they strongly suggest harmonies, and they are in a strong part of the rhythmic structure. The third application of the fan technique as an expressive shift — at the beginning of mm. 10 — functions slightly differently than the first two applications. This is because the performer, in the third application, can highlight the major 9th of the implied C minor chord in the score at mm. 9-10, since extended tertian harmonies are an attention-grabber for the audience. Moreover, because we are applying the fan motion between D and Eb, it is important to acknowledge that the Eb is relevant too; not only it is the highest pitch in this melody, and therefore a climax point in the melody, but also in terms of tonal function it defines the minor character of that C chord. For these reasons, it is relevant for the performer to highlight these notes, and I think the fan motion can bring out these characteristics and embellish these particular sections of this modal melody.

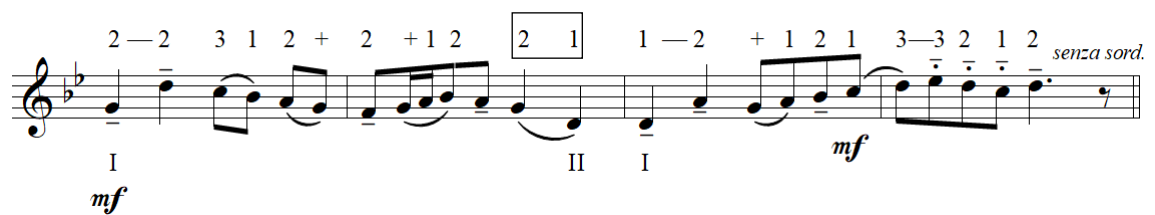


Figure 29. Application of the fan technique as an expressive shift, Prokofiev, *Lieutenant Kijé Symphonic Suite, II mvt. Romance*, mm. 7-10.

For the preparation of the fan technique application in the first phrase, the performer will find in *Tao of Bass* a progressive set of exercises. In chapter one of *Tao of Bass* the fan technique is presented in a series of exercises focused on learning the technique in an abstract environment. Although Machado’s philosophy is to always play

any exercise with musical intention, it does not mean he discourages observation of any of the technical aspects involved during practicing or performing. Therefore, these exercises have a preparatory aspect, which is to observe the left-hand technique — in this case, the fan technique. That said, in chapter three of *Tao of Bass* one can find the fan technique applied to music theory concepts that represent a part of the foundations of music in Western Civilization, such as scales, arpeggios, sequences, etudes, etc.

In exercise no. 3.42 of *Tao of Bass*, the bassist can practice the fan technique with the third finger in a downward motion to master the application of Fig. 28. This exercise is labeled under “Thumb Position Patterns,” and the pattern I selected in Fig. 30 outlines a minor melodic scale meant to be performed within a single position, the fourth position (Rabbath). Since one of the goals of the application is to avoid shifts in order to secure intonation, this exercise is particularly relevant. Furthermore, the exercise allows one to practice both the technique applied to the same pitch collection on the downward motion of the melodic scale and the same fingering pattern — a binary fingering grouping within a position.

Exercise 3.42



Figure 30. *Tao of Bass*, Ex. 3.42, fan technique, third finger in a downward motion, p.152.

Regarding the second phrase of music example no. 10 where the fan technique application is used as an expressive shift, the performer can use ex. 1.19 to prepare the connection between the notes D and A (Fig. 31). By mastering this *Tao of Bass* exercise,

the bassist learns to listen to the accurate pitch value by measuring the interval with a glissando effect. With that in mind, the glissando effect serves as a clue to guide our muscle memory to reach the right pitch value. Although this effect must be exaggerated in the exercise, it will not have the same exaggeration in the application; too much, and it could interfere with the orchestral voicing. The glissando effect must be subtle to not interfere with the viola solo in the second phrase.

Exercise 1.19 *Shifting Exercise to Connect Two Positions*

Figure 31. *Tao of Bass, securing intonation in leaps within a string, p.152.*

The next musical example where the fan technique is applied is taken from the *Pulcinella Suite* by Igor Stravinsky. The well-known solo for double bass and trombone in the seventh movement of the suite contains a variety of challenges that includes articulation control, dynamic control, dexterity for fast passages, and extensive fingerboard mapping; these are probably amongst the most notorious challenges in this

excerpt. The performer will find plenty of passages in *Tao of Bass* that will certainly be able to prepare a bassist for those challenges.

With the fan technique, I decided to apply the technique to one of the passages that is written in the high end of the fingerboard, between the neck and the fourth position (Rabbath). The passage starts in rehearsal no. 93 and lasts three measures, and since the bassist is performing in unison with the trombone, the challenges one must address in this section are articulation in piano, rhythmic precision, and accuracy in intonation. Therefore, the fan technique applied here is meant to aid the bassist when performing a fingering that would secure pitch accuracy and bring a strong rhythmic feeling by improving articulation.



Musical Example No. 11. Stravinsky, *Pulcinella Suite*, VII mvt. *Vivo* (Duetto), Reh. No. 93.

My goal for the application in Fig. 32 was to find a fingering that allowed me to secure intonation. By applying both the fan technique and the crab technique in those three measures of music example no. 11, I was able to play the passage without shifting. Therefore, this application of the fan technique and the crab technique secures intonation through the passage by creating strong points of reference for the performer while also building the performer's muscular memory. Moreover, the bassist, apart from mastering the fan technique, needs to master a large span of patterns for thumb positions to effectively visualize these fingerings. That said, to prepare for music example no. 11 one could practice the fan technique in any of the introductory exercises in chapter three of

Tao of Bass. For instance, the ex. 3.3a in Fig. 33 is a good example of these preparatory exercises. However, I believe that before mastering the fan technique, the bassist needs to be familiar with thumb positions as a part of the whole learning process regarding the excerpt. That is why in Fig. 32 I added a description of the thumb positions according to Petracchi. In Fig. 34 of Tao of Bass we can also observe a couple of examples of Machado’s approach to thumb positions — what he calls “the most common and practical positions”.²³ The deliberate practice of these positions’ patterns will aid the bassist in mapping the high end of the fingerboard while enhancing the perception of these patterns in any performance instance.

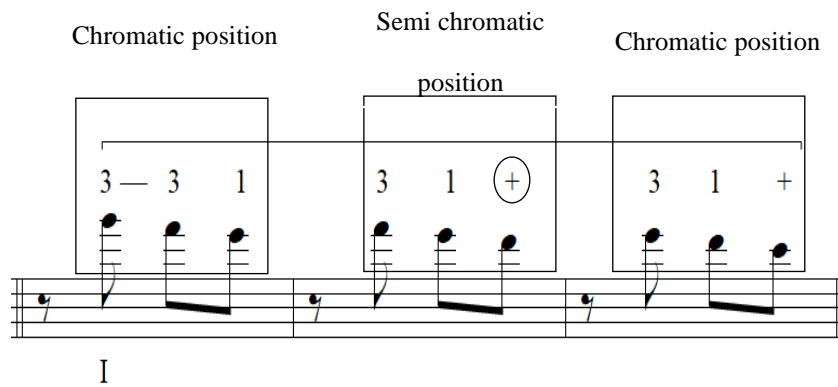


Figure 32. Tao of Bass application of the fan technique, Stravinsky, Pulcinella Suite, VII mvt. Reh. No. 93.

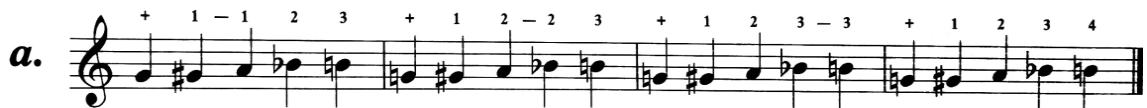


Figure 33. Tao of Bass, ex. 3.3 a, introductory exercise to prepare the fan technique, p. 137.

²³ Marcos Machado, *Tao of Bass*, vol. 1, *The left hand*. (U.S.: 2016): p. 134-135.



Figure 34. *Tao of Bass*, Ex. 3.1 a and b, thumb positions examples, p. 134.

In the last example of the application of the fan technique, I selected an excerpt from Giovanni Bottesini's *Concerto in B minor (trans to A minor)*. Today, this concerto is regarded as one of the pinnacles of literature for double bass, and it is a recurring request in competitions and auditions. Historically, the concerto also stands as one of the most performed and recorded Romantic era concertos. Moreover, Bottesini's passion for opera influenced his compositional style for the double bass solo. Consequently, his music is heavily influenced by opera language, particularly in the Bel Canto style — an Italian opera compositional tradition. This means that the melodic declamation is frequently the focus of Bottesini's music.^{24 25}



Musical Example No. 12, Bottesini, *Concerto in B minor (trans. to A)*, I mvt. Allegro moderato, mm. 23-24.

²⁴ Paul Brun. *A New History of the Double Bass*. (France: Paul Brun Productions, 2000): p. 224-238.

²⁵ Chris Boyder. *Giovanni Bottesini Double Bass Concerto No.2: A performance Guide by C. Boyder*. (N.p.: 2015): p. 3-11

Based on this historical background, much of the success to perform Bottesini's repertoire relies on identifying the phrasing boundaries and points of inflection in it — for instance, the climax of a phrase. In addition, the bassist needs to build their dexterity to a professional level to overcome the virtuoso passages that Bottesini's music displays. To highlight these aspects the performer can use left-hand techniques such as the fan technique. When applying the fan technique as an expressive shift, one can shape phrases by coloring transitions between pitches that have an important function within a phrase. This is not a new practice. During the 19th century it was a common performance practice in string playing to use portamentos and glissandos to accentuate or to announce music nuances within a phrase.²⁶ Moreover, the fan technique can also aid the bassist in performing virtuosic scale passages at fast tempos; when applying the fan technique, one anticipates a fingering pattern that facilitates the coordination of both arms.

In music example no. 12, I selected an excerpt from the second phrase (mm. 21-24) in the exposition of the concerto where I was able to apply the fan technique twice in two different formats (like in Prokofiev's application example). The first application of the fan technique in music example no. 12 was meant to facilitate a virtuosic passage by anticipating a fingering pattern (Fig. 35). The second application of the technique was meant to highlight a pedal note. My idea to announce the arrival to this pedal note with an expressive shift is because this note is the fifth of a dominant harmony in the relative major (C 7) of the principal key (B minor). Therefore, the importance of the pedal note

²⁶ Rey M Longyear. *Nineteenth-century Romanticism in music*. (Englewood Cliffs, N.J.: Prentice-Hall, 1973): p. 350.

relies on the tension it suggests when transitioning into the development of that melodic material in the second phrase.

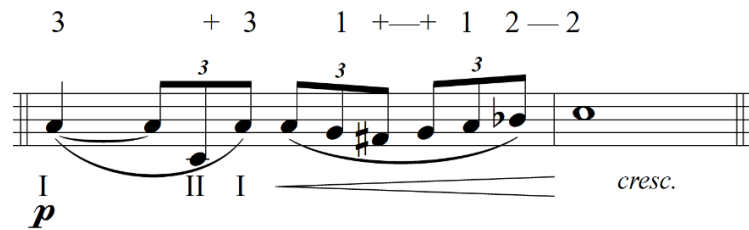


Figure 35. *Tao of Bass application of the fan technique, Bottesini, Concerto in B minor (trans. to A), I mvt. Allegro moderato, mm. 23-24.*

Performing the fan motion with the thumb might seem like performing a regular shift. Most of the time in a traditional shift one arrives at the new position with a different finger. However, the fact that one must slide a single finger to reach the next note demonstrates a particular kind of shift, where one moves into adjacent positions with the same finger. Therefore, the fan technique can be interpreted as a particular type of shift. In this scenario, *Tao of Bass* contains a set of exercises to master the motion of the thumb in the higher register of the double bass focused on mapping adjacent positions. These exercises are in chapter III under the category *Thumb Flexibility*, and they are tailored to improve muscle flexibility in the thumb area of the left hand and tactile sensitivity of the displacement of the thumb while sliding it to adjacent positions. In Fig. 36 I selected ex. 3.55a in which the bassist can practice the fan technique motion with the thumb in half steps within a position and a whole step to shift into the next finger pattern. Furthermore, aside from the similar motion of the thumb as found in music example no. 12, this exercise also strengthens the performer's muscle memory regarding the use of the chromatic position. In this particular case the finger pattern is formed by a whole step

between the thumb and index finger and the half step between index and major, which is same chromatic position and pattern as music example no. 12. For these reasons I found this exercise particularly relevant and helpful to master this section of Bottesini's Concertino.

Figure 36. *Tao of Bass*, Ex. 3.55 a, thumb flexibility exercise to prepare the fan motion +—+, p.154.

Moving to the next part of the application of music example no. 12, I selected the variation “c” of ex. 3.3 from *Tao of Bass*, which is another exercise where one can practice the technique focusing on using the second finger (Fig. 37). Although the exercise was not meant to practice expressive shifts as in Bottesini's music example, it does help to improve the bassist's tactile sensitivity by focusing on performing the fan technique targeting the second finger.



Figure 37. *Tao of Bass*, Ex. 3.3 c, introductory exercise to prepare the fan technique, with emphasis on second finger, p. 137.

To conclude, the fan technique has two outstanding characteristics. The first is that it anticipates the next set of notes or in some cases a new position, as in the application in Bottesini's *Concertino*. This quality is particularly useful to improve intonation and to map the fingerboard in the higher register of the double bass. Second, the *Tao of Bass* set of exercises dedicated to working on the fan technique will improve the bassist's finger tactile sensitivity, an important skill when performing at our highest musical standard.

e. Finger Substitution

Performing shifts without compromising the sound quality of a musical phrase can sometimes be challenging. For instance, when a shift needs to be performed under legato articulation the bassist must articulate every note seamlessly regardless of the challenge the task represents. That said, the finger substitution technique helps overcome this sort of challenge. This technique is introduced in *Tao of Bass* in chapter one and applied throughout the three chapters of the book, highlighting its importance among the presented left-hand techniques. The finger substitution technique is a left-hand motion that anticipates a finger or a position; it aids the bassist when performing these challenging shifts by avoiding distortions in the sound. Technically, the motion involves replacing a finger that is pressing a note with any other available finger. Therefore, to successfully apply the finger substitution technique a musical phrase must contain either a long duration pitch or a repeated one. In this way, the note becomes a pivot where the bassist can switch fingerings within the note to anticipate the next musical gesture. In other left-hand techniques like the crab or anticipation techniques, one pivots with a finger to achieve the next fingering pattern. On the other hand, in the finger substitution technique one pivots within a pitch to achieve the next fingering pattern. Whether we apply the technique to perform a string crossing within a legato mark, a better finger option to perform vibrato, or to anticipate a position for the sake of intonation, the performer's choice of the substituted finger will always depend on the musical premise of the excerpt.

One of the reasons to anticipate a finger or a position is to mask a shift within a legato context. An example of this technical nature can be found in Ludwig van

Beethoven's 9th *Symphony*, from which I selected an excerpt of its *Recitative* in the fourth movement.



Musical Example No. 13. Beethoven, *Symphony No. 9*, IV mvt (recitative) mm. 85-88.

Music example no. 13 can be tricky to perform if we wish to follow the legato indications that Beethoven originally wrote (Fig. 38). Usually, the editions of the symphony that bassists perform are edited either by the printing editorial or by the principal bass by hand (or through an orchestra copyist); the idea behind these editions is to accomplish a version as close to the manuscript or composers' ideas — sometimes not notated at all — as possible. Now, as we compare the Breitkopf & Härtel edition in music example no. 13 to Beethoven's manuscript (Fig. 38), there are some differences regarding this issue. Without entering into an edition's discussion, which is not the core purpose of this dissertation, one can appreciate the composer's idea of a legato phrase for that section of the recitative.

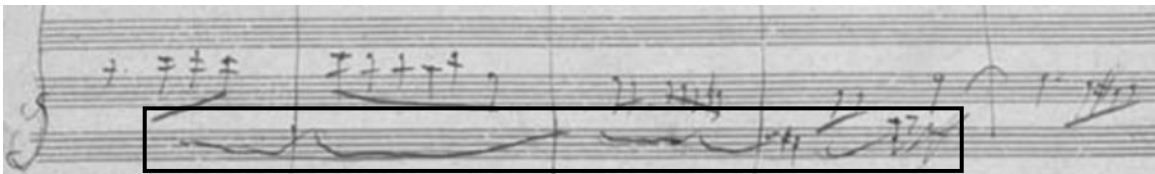


Figure 38. Beethoven's, *Symphony No. 9* (manuscript), displaying the original legato marks of the instrumental recitative selection in the fourth movement.

Therefore, when performing music example no. 13, the bassist needs to create an articulation in legato throughout the selected excerpt no matter which bowings or fingerings one applies. In addition, this excerpt is meant to be played forte, tenuto, and in

unison within the cello and double bass sections. For these reasons, performing this phrase with the attributes discussed is not a simple task. However, left-hand techniques like the finger substitution technique can simplify coordination issues between the arms. When performing long phrases in legato articulation like example no. 13, one can match the bow changes with the finger substitution applications to match musical and technical timing (Fig. 39), facilitating the coordination of the arms. Furthermore, when matching the bow changes with a finger substitution, one is also creating not only pitch reference but also a reference of a specific geometric space in the fingerboard. This translates into an improvement of intonation, since listening to the repeated note helps the bassist tune through an immediate comparison between the notes. This repetition also develops the tactile sensation to swap fingers within a note. Moreover, while performing a finger substitution with a bow change like in the Beethoven example, one creates silent bow changes that facilitate the performance of long phrases in legato articulation.

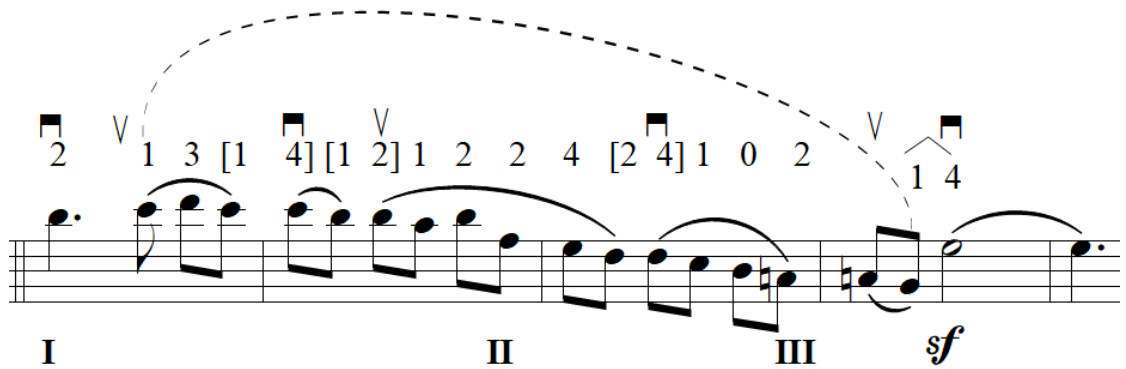


Figure 39. Finger substitution application marked with square brackets in Beethoven's, *Symphony No.9, IV mvt (recitative) mm. 85-88.*

When practicing the finger substitution technique with *Tao of Bass*, the bassist should start a progressive learning process to develop tactile sensitivity while performing

the technique. Exercise no. 1.21 (Fig. 40) is a great point to start developing this technique. This exercise develops tactile sensitivity by performing with the four fingers in the neck position with each finger (index, middle, ring, pinky) within a note in the F major scale. It also possesses a palindrome symmetry in the fingering pattern to help enhance memory. These two qualities facilitate the development of the technique without worrying about complex rhythms and/or unfamiliar shifts, while focusing purely on the technical aspects of the finger substitution. This is a characteristic we find in *Tao of Bass* every time a new left-hand technique is introduced, and a consistent foundation of Machado's philosophies when teaching.²⁷

Exercise 1.21 Finger Substitution

The image shows a musical score for Exercise 1.21, titled "Finger Substitution". It consists of four staves of music, each in a bass clef with a key signature of one flat (B-flat). The notes are quarter notes, and the exercise is designed to be played in a steady, rhythmic pattern. The fingering numbers (1-4) are placed above each note to indicate which finger should be used to play it. The exercise is symmetrical, with the first two staves moving up the scale and the last two staves moving down. The fingering patterns are: Staff 1: 4 2 1 2 4 | 1 2 4 2 1 | 4 2 1 2 4 | 1 2 4 2 1 | 4 2 1 2 4; Staff 2: 1 2 4 2 1 | 4 2 1 2 4 | 1 2 4 2 1 | 4 3 2 1 2 3 4; Staff 3: 1 2 3 4 3 2 1 | 4 3 2 1 2 3 4 | 1 2 3 4 3 2 1 | 4 3 2 1 2 3 4; Staff 4: 1 2 3 4 3 2 1 | 4 3 2 1 2 3 4 | 1 2 3 4 3 2 1.

Figure 40. *Tao of Bass*, Ex. 1.21, finger substitution technique, p. 28.

Another example of the fingering substitution technique is found in Musical example no. 14, which is taken from Piotr Illich Tchaikovsky *Symphony No. 4th*. This excerpt is located in the exposition of the first movement — *Moderato con anima (In movimento di valse)* — and it represents the second theme of the exposition. Musically,

²⁷ Marcos Machado, interview by Patricia Weitzel, *ISB Center Stage no. 6*, August 8, 2020, accessed November 7, 2020, <https://www.isbworldoffice.com/center-stage.asp>.

Tchaikovsky attempts to create a contrast from the ‘Fate’ theme in the introduction of the symphony by increasing rhythmic speed in the variation of the theme. By using a high degree of chromaticism, the composer stratifies the rhythmic texture of the bass line, creating the illusion of a faster pace.²⁸



Musical Example No 14. Tchaikovsky, Symphony No. 4, I mvt Moderato con anima, mm.61-3.

From the perspective of a bassist, chromatic lines with such a complexity in their rhythmic structure demands a multitask effort to control the many parameters involved: complex rhythms, chromatic stratification, dynamic contrast, wide range of pitch, and ensemble-matching complexities. While dealing with the multifaceted nature of the whole performance process, intonation can be negatively affected because our senses are overwhelmed with information. Therefore, the finger substitution technique can help the bassist find the proper intonation by facilitating muscular and sound reference marks through some specific pitches in the excerpt. That is why in Fig. 41 we find these references helpful — they intensify our perception of intonation not only by mere sound reference but also by matching that sonic reference with muscle memory.

Moreover, because of the finger substitution application, one performs a string crossing only a few times, facilitating our music-making process while keeping the

²⁸ Preston Stedman. *The Symphony*. (New Jersey: Prentice-Hall, 1979): p. 172-73.

balance of tone color, and simplifying coordination issues by performing a big part of the excerpt on only one string (the A string). Finally, by applying a combination of techniques found in *Tao of Bass*, the bassist can practically avoid shifts, simplifying their performance even more.

Combination of techniques

The figure shows a musical staff with a bass clef and a key signature of two flats. The notes and fingerings are as follows: 2, 1 (4), 1), 2, 4, 2, [1, 2], 1 2, 4, 1, 4, 2, 2-2, 1. Above the staff, a bracket labeled 'Combination of techniques' spans the entire sequence. Below the staff, a dashed line indicates string positions: II --- III ----- II--I. Dynamic markings 'p' and 'cresc.' are placed under the notes. Technical annotations include 'Pivot' (pointing to the first note), 'Anticipation' (pointing to the second note), 'Finger Substitution' (pointing to the note with fingering [1, 2]), and 'Bridge' (pointing to the final note). 'Same position' is written twice, once above the first group of notes and once above the second group.

Figure 41. P. I. Finger substitution application (plus a combination of techniques from *Tao of Bass*) in Tchaikovsky, *Symphony No. 4, I mvt Moderato con anima mm.61-3*.

That is why in Fig. 42 I selected exercise 1.28 from *Tao of Bass*, which is suitable to prepare for the Tchaikovsky excerpt. Labeled as “Finger Substitution,” this exercise prepares the upward and downward motion of the left hand in a G chromatic scale while applying the technique. Furthermore, the finger substitution applied in Fig. 41 is a downward finger substitution, where one substitutes the index with the middle finger.

The *Tao of Bass* exercise in Fig. 42 situates the bassist in a similar musical and technical context as musical example no. 14. This makes exercise 1.28 (Fig. 42) an excellent option to master the finger substitution technique within the musical context of music example no. 14.

Exercise 1.28 Finger Substitution



Figure 42. Finger substitution in *Tao of Bass*, Ex. 1.28, preparatory for Tchaikovsky, *Symphony No. 4 (1 mvt Moderato con anima mm.61-3)*, p. 34.

The last example that effectively demonstrates the finger substitution technique is found in Serge Koussevitzky's *Concerto in F# minor* (transposed to orchestra tuning: E minor). This is an excellent example that proves how this technique can be applied throughout the fingerboard. As a solo double bass composition, Koussevitzky's concerto is a standard in auditions and competitions, as well as an integral part of the Western culture's repertoire since its inception in 1902. Music example no. 15 stands as the last section of the exposition in the first movement, and as expected its resolution is in the key of the concerto. This particular section also demonstrates the importance of melodic material for the composer. Its rhythmic simplicity leaves the performer with the responsibility of performing a flawless intonation under exuberant expressive conditions. As a conductor, Koussevitzky was considered an expert on Romantic music. His performances as a double bassist and conductor frequently involved the freedom of

interpretation and dramatic intensity — two of the features of Romantic music.²⁹

Therefore, from melodic sections like music example no. 15, it is expected that the bassist will work towards these ideals to achieve a historically informed performance of the concerto.



Musical Example No. 15. Koussevitzky's, Concerto in F# minor (transposed to orchestra tuning: E minor), I mvt. Allegro, Alla breve (a tempo) mm. 37-40.

That being said, the finger substitution technique works here to achieve two characteristics in the interpretation of the excerpt: intonation accuracy and expressiveness. First, as one observes in the application of the technique in Fig. 43, the technique is effective in transitioning between the first two measures of the example. Here, the finger substitution helps to maintain intonation accuracy by applying the technique in the repeated note, making the shift subtle and precise regarding intonation. Second, the next two applications in Fig. 39 are dedicated to achieving the expressive element by replacing the note in question to arrive at an important note of the harmonic progression (V– I) with the middle finger. This particular finger is more accessible than the others when performing vibrato because of its intrinsic nature. Since the middle finger (finger: 2) is the longest and the geometric center of the hand, it allows one to perform

²⁹ Leon Botstein. "On Conductors, Composers, and Music Directors: Serge Koussevitzky in Retrospect." *The Musical Quarterly* 86, no. 4 (2002): 583-90. Accessed January 19, 2021. <http://www.jstor.org/stable/3600971>. Pag. 584-85.

wider and more controlled vibratos. This is due to its balanced gravitational center which helps to perform a steady vibrato, and because it possesses the longest length from the elbow to the middle fingertip, allowing the bassist to reach the maximum amplitude of vibrato. This makes the middle finger anatomically ideal for performing a variety of vibratos when ornamenting the desired notes in music example no. 15 for the sake of expressiveness.

Finger substitution for the sake of
expression.

Finger substitution for intonation
accuracy.

Third interval of the
resolution chord (E minor)

Tonic and resolution chord
(E minor) of the

Figure 43. Finger substitution application in Koussevitzky's, Concerto in F# minor (transposed to orchestra tuning, E minor), I mvt. Allegro, Alla breve (a tempo) mm. 37-40.

When preparing the finger substitution technique in the higher range of the double bass, exercises nos. 3.110 and 3.58 of Tao of Bass are great options to practice and master the musical nuances of the application in Fig. 43. That said, at the beginning of the application in Fig. 43 the finger substitution technique is dedicated to achieving intonation accuracy. For the purpose of mastering the technique when substituting the first finger for the third, the bassist can practice exercise no. 3.110 (Fig. 44) or the

“Cossmann Exercise.” This exercise was adapted from Bernard Cossmann’s cello book, *Studies for Developing Agility for Cello*; other contemporary pedagogues, such as Professors Gary Karr and Dennis Whitaker, have implemented similar strategies. This is because of its value of being a multidimensional exercise, in terms of the many techniques and performance issues that this exercise holistically works at once.

Regarding the finger substitution technique in this exercise, one can observe the fingering sequence progressively substituting its precedent fingering pattern chromatically. For the application itself, observe measures two and seven in Fig. 44, and notice how the fingering sequence substitutes the exact fingering substitution pattern that I applied in Fig. 43 —by means of substituting the first for the third finger. In this way, the preparation of the substitution is achieved progressively due to its chromatic characteristic, helping the bassist listen to the quality of the intonation in detail. Also, it increases the bassist’s awareness to identify the different fingering spacings in different position patterns; this improves our kinesthetic sense and our proprioceptive sense of the fingerboard in relationship with our body, consequently improving intonation accuracy.

Exercise 3.110 *Cossmann Exercise*



Figure 44. Finger substitution in *Tao of Bass*, Ex. 3.110, excerpt of *Cossmann Exercise* as preparatory for the excerpt (mm. 37-40) of *Koussevitzky, Concerto in F# minor* (transposed to orchestra tuning, *E minor*), I mvt. *Allegro, Alla breve (a tempo)*, p. 18.

Regarding the application of the fingering technique with expressive aims, example no. 3.56 in Fig. 45 suits this purpose well. Although the exercise in Fig. 45 is focused on mastering diatonic intonation, it is also great to master the technique while substituting fingers within a note. What is particularly relevant is that the substituted fingering pattern is the exact pattern used at the application in Fig. 43. Furthermore, the rhythmic change to longer length durations during the substitution magnifies the intonation details, strengthening our listening skills. This helps the bassist identify the correct motion when matching the note pitch with different fingers in the higher positions of the double bass.

Exercise 3.56 *Diatonic intonation*

The musical score for Exercise 3.56, titled "Diatonic intonation", is presented in five staves of music. It begins with a tempo marking of quarter note = 62. The first staff is in the key of F# minor (one sharp) and contains six measures of eighth-note patterns with fingerings (1, 3, 1, 2), (3, 2, 1, 3), (1, 3, 1, 2), (3, 2, 1, 3), (1, 2), and (1, 3, 1, 2). The second staff continues with six measures, including a key signature change to E minor (one flat) in the fifth measure, with fingerings like (3, 2, 1, 3), (1, 3, 1, 2), (3, 2, 1, 3), (1, 2), (1, 3, 1, 2), and (3, 2, 1, 3). The third staff has six measures with fingerings such as (1, 3, 1, 2), (3, 2, 1, 3), (1, 2), (1, 3, 1, 2), (3, 2, 1, 3), and (1, 3, 1, 2). The fourth staff contains six measures with fingerings like (3, 2, 1, 3), (1, 2), (1, 3, 1, 2), (3, 2, 1, 3), (1, 3, 1, 2), and (3, 2, 1, 3). The fifth and final staff has six measures with fingerings such as (1, 2), (1, 3, 1, 2), (3, 2, 1, 3), (1, 3, 1, 2), (3, 2, 1, 3), and (1, 2), ending with a double bar line.

Figure 45. Finger substitution in *Tao of Bass*, preparatory exercise for the excerpt (mm. 37-40) of Koussevitzky, *Concerto in F# minor* (transposed to orchestra tuning, *E minor*), *I mvt. Allegro, Alla breve* (a tempo), p. 156.

All in all, the finger substitution technique is a valuable technical resource to resolve unfamiliar shifts, or to respond to the expressive demands of a musical challenge by means of satisfying the expressive needs of our concept and ideas of how a particular

musical phrasing should be shaped. This technique works great to move within adjacent notes (chromatically and diatonically) without shifting. In addition, when applying the technique to avoid shifts or string-crossing situations, the finger substitution technique helps to balance the tone color of our phrases. This is because the nature of the technique is to move within a single string.

f. Fork

The fork technique, named by Machado after the resemblance of the shape of the left hand to a fork, is a left-hand technique to perform across two adjacent strings.³⁰ Although it is mostly used to perform intervals of a fourth between two adjacent strings, Machado uses it more broadly, such as when performing intervals of a minor seventh between three adjacent strings (Fig. 46).

Exercise 2.31 "Fork" Exercise



Figure 46. Fork technique in *Tao of Bass*, Ex. 2.31, intervals available when performing this technique.

This technique has a precedent in *Tao of Bass*: the bridge technique (which is discussed earlier in this dissertation chapter). Although both techniques perform the same intervals, their application can be distinguished by the different shapes of the hand when performing them. The bridge technique as mentioned earlier in the chapter produces a handshape that presents a barred finger while pressing across two or three adjacent strings. This contrasts to the fork technique, which produces a handshape that resembles a fork with two fingers pressed across two or three adjacent strings instead of a barred finger. While the intervals produced by both techniques are the same, the reason for their

³⁰ Marcos Machado, "Integral Technique" (video of lecture, Discover Double Bass) November, 2019, accessed January 15, 2021, <https://courses.discoverdoublebass.com/courses/635317/lectures/11472278>.

application resides in the nature of the excerpt. For instance, when the excerpt is suitable for the application of the fork technique, the bassist must be aware of the two pros of this technique. First, because the technique requires a change of posture regarding the angle of the left arm to place the left hand in an angled position — the left elbow ascends in conjunction with the hand — this technique transduces the weight of the arm with ease and secures the position. Second, the application of this technique works as an anticipation device, musically and technically. This is especially relevant when moving from lower positions to thumb positions. The change of the angle in the arm is the same as the one the bassist has to perform to transition successfully from lower positions to thumb positions. Therefore, when the bassist is performing this technique in the lower neck positions, one can take advantage of this technique to prepare the arm to smoothly transition within different ranges of the fingerboard if needed. A music example of this sort of application is Alberto Ginastera's solo in his symphonic instrumental work, *Variaciones Concertantes*.



Musical Example No. 16. Ginastera, *Variaciones Concertantes* Var XI mm. 4-3.

In music example no. 16, Ginastera wrote a melody around an e minor 7th chord, which thoroughly explores the pitch range of the double bass. This melodic passage takes over from the lowest of a traditional four-stringed double bass in orchestral tuning — an open E — to a B in the first thumb position (or fourth position: Rabbath) within the first string.

In the application of Ginastera's music example, I was able to benefit from both the bridge and fork techniques. However, since my aim in this section of the chapter is to discuss the fork technique, I will focus on the application of this technique only. That said, the first time I apply the fork technique is not only to anticipate the third finger to perform the perfect fourth (B & E), but most importantly to anticipate the thumb position posture and secure the leap of a fourth (E & B) within the G string. The fork technique secures transitioning without sonic or physical interruptions by anticipating the posture change of the left arm to move through the lower neck positions to the higher positions. While placing the posture for the fork technique, the bassist can secure the thumb in the fingerboard — a low thumb position placement. Therefore, the technique effectively anticipates the next pitch without falling into an abrupt motion when performing the discussed leap. In the application (see Fig. 47), I placed an accidental quarter note with a thumb sign, which means that one must place the thumb before playing the last sixteenth note (E).

The second time I applied the fork technique in Fig. 47, it was to secure intonation. In the second measure of music example no. 16, the bassist arrives at the first thumb position (or fourth position: Rabbath); by applying the technique one can stay in the same position through the whole measure. Consequently, the technique improves intonation by simplifying the bassist's left hand motion pattern, generating a strong proprioceptive sense and awareness of the placement relationship between the left hand and the fingerboard. Furthermore, since the next two measures after measure four are also in thumb positions, applying the technique avoids shifting to a lower position, resulting in an improvement in the intonation of these measures.

Bridge technique

Fork technique

0 1 1 4 1 2 3 1 3 1 3 + 3 2

mf

IV III II III II I II---- I II I-----II

Detailed description: This figure shows a musical staff with a treble clef. Above the staff, a sequence of numbers represents fret numbers and fingerings. The sequence is: 0, 1, 1, 4, 1, 2, 3, 1, 3, 1, 3, +, 3, 2. Brackets above the staff group these into 'Bridge technique' (covering 0-1-1-4-1) and 'Fork technique' (covering 2-3-1-3-1-3-+-3-2). Below the staff, a series of Roman numerals indicates fret positions: IV, III, II, III, II, I, II, followed by a dashed line, then I, II, I, followed by another dashed line, and finally II. A dynamic marking 'mf' is placed below the staff. A circled 'C' is written above the staff at the 5th fret position.

Figure 47. Fork technique application in Ginastera’s, *Variaciones Concertantes Var XI* mm. 4-3.

Exercise 3.21

Detailed description: This figure shows a musical staff with a treble clef. The notation consists of a sequence of notes with fingerings: a plus sign (+), a bracketed pair (2, 3), 1, a plus sign (+), 1, a plus sign (+), and 2. Below the staff, Roman numerals indicate fret positions: II, I, II.

Figure 48. Fork technique, *Tao of Bass*, fingering pattern applying the fork technique, identical to Fig. 47.

To prepare the fingering pattern found in music example no. 16, the bassist can access exercise no. 3.21 in *Tao of Bass* (Fig. 48). Although the pitch set in Fig. 48 is not the same as in Ginastera’s excerpt, the fingering pattern does match Ginastera’s application in Fig. 47. Moreover, while Ginastera suggests a G major tonal center in this passage of the excerpt, the *Tao of Bass* example suggests a C major harmony. However, in Machado’s *Tao of Bass*, it is notated to practice this exercise between two strings and to transpose the exercise chromatically and diatonically.³¹ The bassist can benefit from

³¹ Marcos Machado, *Tao of Bass*, vol. 1, *The left hand*. (U.S.: 2016): p. 149.

transposing this fingering not only to improve dexterity but also to improve the mapping of the fingerboard in the thumb positions.

The next music example is an excerpt from Beethoven's *Symphony No. 7*, first movement, *Vivace*. The arpeggio sequence in music example no. 17 extends into a two-octave range at a fast tempo, a challenging task if we consider that the motion from the highest A to the lower A of the example implies moving the left hand approximately two feet throughout the fingerboard. Moreover, this distance can interfere in the articulation of the passage if the fingering pattern possesses numerous shifts, which creates coordination issues. That said, efficiently anticipating the technical timing is crucial to succeeding in the performance of music example no. 17. Thus, the bassist can use the fork technique to anticipate the musical timing by reducing shifts as much as possible.



Musical Example No. 17. Beethoven, *Symphony No. 7*, I mvt. *Vivace*, mm. 160-161.

In the application (Fig. 49) of the fork technique in music example no. 17, I applied the technique twice using the same fingering pattern. Moreover, applying the fork technique with the same fingering pattern allows the bassist to correlate physical gestures that would enhance and refine his/her kinesthetic sense. Also, by reducing the motion to two shifts — that happen after and before playing the same note (A) — the bassist would be able to recognize a fingering pattern that is easy to remember; consequently, this would allow one to anticipate the technical timing. Lastly, the reduction of shifts while

applying the fork technique implies a motion with moderate activity in the left arm. This simplifies the physical effort, and ultimately improves the bassist's endurance while performing. This is essential because Beethoven's Symphonies are long-length compositions, demanding a significant magnitude of physical effort from the bassist to perform at their best throughout any of his symphonies.

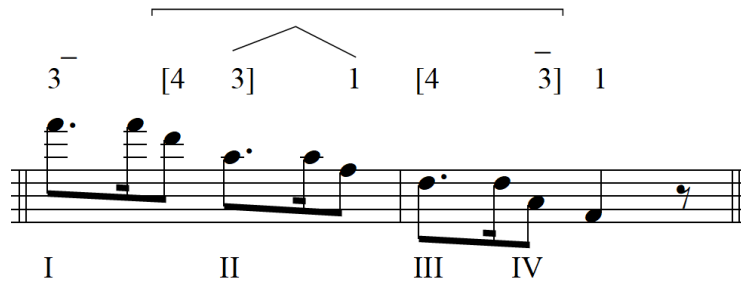


Figure 49. Fork technique application in Beethoven's, *Symphony No. 7, I mvt. Vivace*, mm. 160-161.

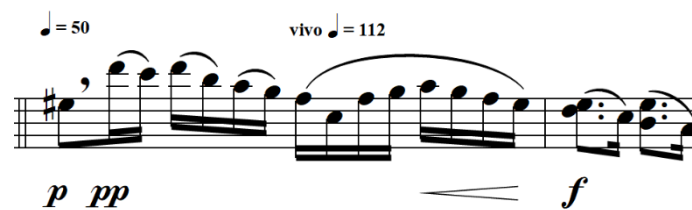
When preparing the application in Fig. 49, *Tao of Bass* exercise no. 2.87 (Fig. 50) will aid the bassist in mastering the technique when applying the fingering pattern used in the application. Furthermore, this exercise contains a circle of fifths, which creates awareness in our listening skills when there is polyphony implied in a melodic line. Therefore, it is suitable to improve our listening skills to prepare any excerpt involving arpeggios in a bass line or in a melodic line with leaps.

Exercise 2.87 Fork



Figure 50. Fork technique, *Tao of Bass*, Ex. 2.87, to prepare arpeggios patterns in the orchestral and solo repertoire, p.109.

Music example no. 18 is Heinz Karl Gruber’s cadenza for Johann Baptist Vanhal’s *Concerto in Eb*. This cadenza is accepted by the double bass community as the one typically required for auditions, competitions, and performances. Since H.K. Gruber is a contemporary composer, his cadenza was written in a style that reflects the Western traditions of the 20th century. Furthermore, H.K. Gruber was a pupil of the virtuoso double bass performer and pedagogue Ludwig Streicher. Perhaps this is why the cadenza explores the double bass pitch range, the technical aspects, and the expressiveness in a way that contrasts the practice performance traditions of the original score. Moreover, the cadenza was published in 1978, and the collaboration between pupil and teacher can be traced in the edition since L. Streicher is the editor for the original publication.^{32 33}



Musical Example No. 18. Gruber cadenza for Vanhal, *Concerto in Eb* (transposed to D major), I mvt. Allegro moderato, mm. 16-17.

The application of the fork technique in music example no. 18 was applied to secure the flow of the sixteen notes under the slur and to secure the double stops intonation by anticipating their position. This was accomplished by applying a combination of techniques to avoid shifts across four beats. In such a combination (Fig.

³² Boosey and Hawks, “HK Gruber: Biography,” Boosey and Hawkes Composer Index, December, 2017, accessed February 3, 2021, <https://www.boosey.com/pages/cr/composer/composermain?composerid=2843&ttype=BIOGRAPHY>

³³ Heinz Karl Gruber, *Cadence for J.B. Vanhal Concerto*, ed. Ludwig Streicher, (Vienna: Ludwig Doblinger -Bernhard Hermansky-) 1978.

51), the first application of the technique allowed me to perform the perfect fourth leap without shifting. Second, right after applying the fork technique, I applied the fan technique, with the purpose of avoiding shifts by anchoring the thumb in *G*, thus, securing the intonation of the double stops within that position.

The musical score for Figure 51 is presented in two parts. The first part, at a tempo of quarter note = 50, consists of two measures. The first measure is marked with dynamics *p* and *pp*. The second measure, marked *vivo* at a tempo of quarter note = 112, is marked with dynamic *f*. The score includes fingering numbers: 1, 2, 1, +, 3, 2, [2, 1], 2, 2, 3, 2, 1, +, 2, 1, +, 4. Position markings are I, II, I, II, I, II. A trapezoidal symbol indicates a dynamic change from *p* to *f*.

Figure 51. Fork technique, application in Gruber Cadenza for Vanhal, Concerto in *E_b* (transposed to *D* major), I mvt. Allegro moderato, mm. 16-17.

To perform the fork technique within a left-hand position requires the bassist to be physically dexterous. This is especially relevant when using this technique because, as mentioned before, one has to change the left-hand position without losing pitch and/or fingerboard references — such as a note, a harmonic, or a position. Machado is a notable advocate for bassists developing left hand flexibility. For that purpose, he introduced in *Tao of Bass* a series of exercises dedicated to developing the bassist’s left-hand flexibility. In Fig. 52, I selected exercise no. 3.123 which develops the bassist’s left-hand flexibility within a position while using the fork technique.

Exercise 3.123 Flexibility

♩=120



Figure 52. Fork technique, selection from Ex. 3.123, to develop flexibility within a position while applying the fork technique, p. 196-197.

To conclude, one must bear in mind two positive aspects of the application of the fork technique. First, it helps develop flexibility in the left arm, since its application requires the combination of motions that alternates the position of the left hand. Second, it is a technique that allows the effortless performance of a leap of a fourth or a minor seventh, because it anticipates one of the notes within these intervals. Therefore, the fork technique is also a tool to anticipate the technical timing in a musical phrase.

g. Four-finger Technique

The four-finger technique in Tao of Bass is a fingering system and approach to double bass performance that has been applied since the late 18th century.³⁴ This technique consists in the application of the four left-hand fingers in the fashion of violoncello or violin left-hand techniques.³⁵ ³⁶ This means that in a single position over a single string, the left hand covers a minor third between the index and pinky fingers. Such a position is not possible to achieve in every position of the double bass without the use of the pivot technique or the addition of the thumb. This is because in the lower positions in a double bass fingerboard the geometrical length of a minor third exceeds the length of an average adult left hand; thus, the bassist must perform a pivot to reach such a distance. The opposite phenomenon happens in the higher positions of the double bass. The length between notes shrinks considerably, and consequently, the left hand shrinks to adjust properly to the lengths of this section of the double bass. In such a context, the pinky finger is mostly avoided, and the thumb is introduced to preserve the pitch set of the four-finger technique pitch proportions. That said, when the four-finger technique is applied, the left-hand positions throughout the fingerboard conform consistently to an internal subdivision between each finger that equals a half step. Furthermore, this technique contrasts with the fingering systems found in the German and the Italian traditional schools of double bass regarding its fingering pattern. Pedagogues who advocate for the four-finger technique approach can be traced throughout the history of

³⁴ Paul Brun. *A New History of the Double Bass*. (France : Paul Brun Productions, 2000): p.83.

³⁵ Carl Flesch. *Violin Fingering: Its Theory and Practice*. Reprint, (New York: Da Capo Press, 1979): p.9.

³⁶ Claude Kenneson. *A Cellist Guide to The New Approach*. (New York: Exposition Press, 1974): p.65-66.

the double bass. One way to prove its historic path is through the publication of methods dealing with the technique. Perhaps the most notable publications were by Friederich Christoph Franke and Friederich Warnecke during the 19th century, and those by Rabbath, Silvio Dalla Torre, and Machado in the 20th and 21st century.

In regard to Machado's teaching and performance approach, he strongly advocates for the application of the four-finger technique, dedicating the second chapter of *Tao of Bass* to explore the possibilities of this technique. Although there are variations of how the bassist can apply the four-finger technique (depending on the pedagogue's approach), Machado promotes this technique without the use of extensions and relies almost exclusively on the use of the pivot technique when applying it. This means that the left hand remains in a relaxed state while the bassist applies the technique.³⁷

In the first application of the four-finger technique, I will discuss an excerpt from the opera *Othello* by Giuseppe Verdi. In the fourth act of this opera the double basses have a soli that is a part of the core repertoire for professional auditions, especially when auditioning for opera orchestras. One of the characteristics of this soli is its melodic character that accompanies the libretto narration when Othello agonizes over killing his wife, Desdemona. These melodic passages in the excerpt contain many sections in legato articulation as an expressive device. One of these melodies is represented in music example no. 19, in which the four-finger technique is applied to achieve such an articulation. Furthermore, music example no. 19 is a melody that resembles a lament bass — a descending bass line used in the Baroque to express sadness. The legato passage

³⁷ Marcos Machado, "Integral Technique" (video of lecture, Discover Double Bass) November, 2019, accessed January 15, 2021, <https://courses.discoverdoublebass.com/courses/635317/lectures/11472278>.

follows the harmonic progression usually found in a lament bass; this starts a fourth above the tonic (F minor) and descends into the dominant (in second inversion). Carrying such a line in legato is important to achieve the dramatic effect of the outlined harmony.



Musical Example No. 19. Verdi's, Othello, Act IV, two mm. before reh. no. V.

In this musical context the application of the four-finger technique (see Fig. 53), combined with the pivot technique, will help the bassist avoid shifts in the first legato articulation of the example. The second legato articulation will start from a secured position regarding intonation, since the previous four-finger technique application leaves the left hand in position to perform the legato gesture without shifting. After this, the bassist can apply the anticipation technique (Fig. 53) between adjacent strings to avoid shifts during the second legato mark. Finally, to resolve the harmonic progression of the phrase into Eb (fifth of the dominant) one can apply a pivot within the third string to reach this pitch. Moreover, thanks to the combination of these techniques the bassist is able to avoid shifts and secure intonation throughout the excerpt for the sake of expression.

To deal with these technical aspects of the left hand, I selected an exercise that concerns the four-finger technique and fine tunes the bassist's left-hand flexibility. It also encourages the use of the pivot and the four-finger techniques with the same intervallic proportions of the application (Fig. 53). Furthermore, it encourages the mapping of the position in its internal fingering pattern configuration, positively developing intonation and dexterity in the left hand. That is why exercise no 2.44 in Fig. 54 is a good example

to include in the bassist's preparation of music example no. 19 when mastering these technical challenges.

Four-finger technique

+ Pivot Anticipation Pivot

↑ ↑ ↑

2 4 3 1 2 (1 4) 1

Figure 53. Four-finger technique application in Verdi's, *Othello*, Act IV, two mm. before reh. no. V.

Exercise 2.44 Articulation

$\text{♩} = 152$

A.

B.

C.

D.

Bow Variations

Figure 54. Four-finger technique in Tao of Bass, Ex. 2.44, equal intervallic proportions to *Othello*'s excerpt.

For the second application of the four-finger technique, I will discuss an excerpt from the first movement of Mozart's *Symphony 35*. This excerpt, music example no. 20, resembles a turn, ornamenting the B note in a virtuosic style. When analyzing the score one can observe that this note (B) is the bass of a secondary-dominant in first inversion that announces a new section within a dominant harmony (over A Maj 7) — it is thus an important event in this harmonic progression. Moreover, Mozart instrumented this passage for almost every instrument in the score. That said, in matters of articulation this melodic gesture needs to be coherently identical within the voices in the score to achieve vertical homogeneity in the harmony.

From the perspective of a bassist, these musical conditions make this passage important for two reasons. First is the performance of an accurate articulation within the ensemble, where each note within the melodic gesture must match the rest of the orchestra when playing it. The second reason is intonation accuracy; the bassist needs to perform flawlessly in tune for the sake of the harmonic progression.



Musical Example No. 20. Mozart's, *Symphony No. 35*, I mvt. *Allegro con spirito*, mm. 27.

These two reasons justify the application of the four-finger technique in Mozart's excerpt (Fig. 55). When applying it, the bassist is able to perform the passage without shifting, which helps to resolve intonation and coordination issues that could negatively affect both the articulation and the intonation. Additionally, it improves rhythmic

accuracy since the four-finger technique will help the bassist assign a fingering pattern that matches the rhythmic pattern of the melodic gesture. It also matches left-hand techniques from violoncellos and violas who will also perform this passage with a four-finger technique; at the same time, it will improve the tone color within the string family in the ensemble. Furthermore, the general left-hand gesture of the orchestra when playing this passage will be perceived as one — a choreographic gesture — helping the ensemble perform accurately together.

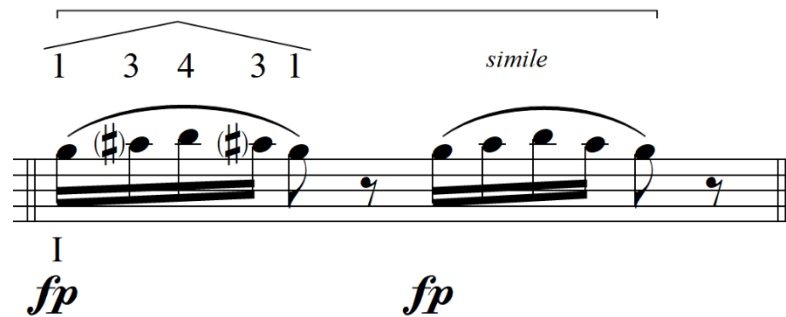


Figure 55. Four-finger application in Mozart's, *Symphony No. 35, I mvt. Allegro con spirito*, mm. 27.

When mastering virtuosic orchestral excerpts like music example no. 20, the four-finger technique is an important left-hand technique for the bassist. As mentioned before in *Tao of Bass*, the bassist can find a compendium of exercises dealing with the four-finger technique to train for various musical challenges of this kind. The bassist's dexterity is also important to Machado when approaching virtuosic passages – this is why *Tao of Bass* includes a variety of exercises meant to resolve dexterity issues.

Exercise no. 2.25 (Fig. 56) explores the four-finger technique in a similar context to music example no. 20. This exploration approaches a virtuosic stratified rhythm and the variants of the intervallic proportions of a minor third between index and pinky fingers. In consequence, the fingering applied in the excerpt (Fig. 55) relates to the one in

exercise no. 2.25 (Fig. 56). This makes this exercise suitable to prepare Mozart's excerpt and master a very important aspect of a bassist technical skills: the development and maintenance of the fitness of the left-hand fingers (in other words, the dexterity of the left-hand fingers).

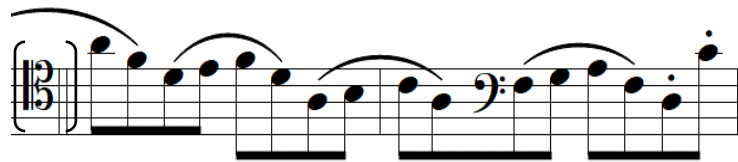
Exercise 2.25 Dexterity

♩=100-168

Figure 56. Four-finger technique in Tao of Bass, Ex. 2.25, to prepare the minor third intervallic proportions found in Mozart's excerpt.

The last excerpt that discusses the four-finger technique is Johann Sebastian Bach's *Suite for Violoncello No. 3, Bourrée I*. The *Violoncello Suites* are both a source of musical joy and a representation of the technical challenges a bassist may experience when preparing for an audition. There is also evidence that Bach had not only interest in music as an art but also as an academic practice. Accordingly, the *Violoncello Suites* have the academic characteristics that underline a pedagogic scheme in a progressive work to

develop a virtuosic level of musicianship for the cellist.³⁸ Moreover, the *Violoncello Suites* were borrowed by the double bass community, and today all the suites encompass one of the cornerstones of the double bass solo repertoire. That said, when choosing a version of the suites to perform, the decision might be difficult, especially when considering originality, phrasing style, and transpositions. I chose the edition by the virtuoso and professor Miroslav Gajdos, and my decision was based on personal preference — I like professor M. Gajdos' musical phrasing.



Musical Example No. 21. Bach's, Cello Suite No. 3, Bourrée I (phrasing and bowings edited by M. Gajdos), mm.21-22.

In Gajdos' edition, he highlights the sequential melodic gestures ornamenting the D maj. triad by slurring the melodic patterns in music example no. 21. The shape of these melodic gestures are similar to a turn; each emphasizes one of the notes in the D maj triad. The ideal fingering will imitate this melodic shape to bring out the outlined harmony (D maj.). In the application of the technique to music example no. 21 (Fig. 53), every melodic gesture is accompanied by a fingering pattern that matches the melodic

³⁸ Allen Winold. *Bach's Cello Suites, Vols. 1 and 2 : Analyses and Explorations*. (Bloomington: Indiana University Press, 2007): p. 1-12 accessed February 25, 2021. <https://search-ebshost-com.lynx.lib.usm.edu/login.aspx?direct=true&db=e00xna&AN=644486&site=ehost-live>.

progression within the slur. The first melodic gesture is in the thumb position and the four-finger technique does not apply there. However, once the bassist transitions to the lower positions on the neck, the next two melodic gestures encompasses a minor third interval each, and are ideal for the application of the four-finger technique. The first of these two melodic gestures is organized in a whole step followed by a half step (fingering pattern: 1 3 4), or a “minor position” according to Machado. The second melodic gesture is organized in a half step followed by a whole step (fingering pattern: 1 2 4), or a position Machado named “the Phrygian position,” since it is the exact intervallic proportion of the first three notes in a Phrygian mode.³⁹

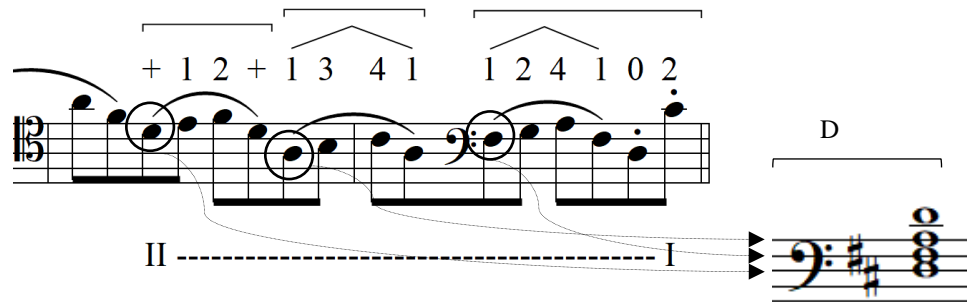


Figure 57. Four-finger technique application in J.S. Bach’s, Cello Suite No. 3, Bourrée I, following the melodic shape with a fingering pattern outlining a D maj. harmony.

Mastering the four-finger technique is a way to achieve proficiency in articulating melodic gestures at fast tempos, such as in music example no. 21. One of the first steps in mastering the four-finger technique is knowing the configuration of the fingering patterns this technique produces. In Fig. 57 I applied two fingering patterns that Machado

³⁹ Marcos Machado, “Integral Technique” (video of lecture, Discover Double Bass) November, 2019, accessed January 15, 2021, <https://courses.discoverdoublebass.com/courses/635317/lectures/11472278>.

describes as “basic positions,” and these were described previously in this discussion. The reason I included exercise no. 2.14 of *Tao of Bass* (Fig. 58) is because three of the most used fingering patterns are organized within the same tonic to highlight and compare its different intervallic proportions. Therefore, the bassist can easily identify and listen to the intervallic proportions of these positions and extrapolate them to other positions according to a particular situation. In the case of music example no. 21, the Minor and Phrygian positions are applied sequentially in that order in Fig. 57.

Exercise 2.14



Figure 58. Four-finger technique in *Tao of Bass*, three diatonic patterns within a string.

To close the discussion of the four-finger technique, I would like to point out two of the benefits of the application of this technique. The first is the bassist gains articulation clarity at fast tempos — this is much needed during virtuosic passages. The second is the capability of the four-finger technique to group intervals within a major third interval in one string, freeing the bassist from unnecessary shifts that could interfere with the music making.

h. Pivot

In *Tao of Bass*, Machado describes that the pivot technique is a motion that can be described as “a rotation of the forearm around the thumb.”⁴⁰ Moreover, the pivot technique concept is self-contained in its meaning, as its definition implies moving an object connected to a fixpoint. Thus, the object’s motion and trajectory are determined by this fixed point. In the context of the physique of the bassist’s left hand while pivoting, the fixed point is the tip of the thumb in contact with the back of the neck, and the object that moves around the thumb placement (the fixed point) is both the forearm and the left hand in a symbiotic rotative motion.

When discussing the musical purpose of the application of this technique, the primary aspect is that this motion facilitates the bassist’s range of reach of their left hand within a position. The immediate outcome of the pivot technique is that one avoids shifts. This is especially important when the musical and the technical time are set at fast tempos. In such performing scenarios, shifting will tend to drag the bassist’s technical timing, as these require an intense involvement and motion of the left arm. On the other hand, pivoting can spare part of the arm motion for the sake of speed and accuracy; it would thus facilitate the technical and musical timing.

Another positive aspect of the pivot technique is the range of motion while pivoting — this range covers a minor third, but it can cover a major third, or in some cases a fourth (the “Davidov’s hinge”).⁴¹

⁴⁰ Marcos Machado, *Tao of Bass, vol. 1, The left hand*. (U.S.: 2016): p. 71

⁴¹ Marcos Machado, “Integral Technique” (video of lecture, Discover Double Bass) November, 2019, accessed January 15, 2021, <https://courses.discoverdoublebass.com/courses/635317/lectures/11472278>.

The last characteristic of the pivot technique is the fingering pattern combinations while applying the technique. In *Tao of Bass* this is a major aspect of the pivot technique. Machado worked the pivot technique and the four-finger technique together (chapter II) because, as he expresses, these techniques “coexist”.⁴² In this sense, the application of the four-finger technique serves as a bridge to combine and permutate different configurations of fingering patterns while pivoting. Although, the pivot technique can also be combined with other fingering pattern schools, like the German (124) or the Italian (134), to expand the options of fingering patterns.

The next music example belongs to Richard Strauss’ symphonic poem, *Hero’s Life*. In music example No. 22, I selected an excerpt within “The Hero’s Battlefield” section.



Musical Example No. 22. Strauss, *Hero’s Life* “The Hero’s Battlefield” two mm. after Reh. No. 64.

Strauss’ excerpt is a good example for understanding the motion direction of a pivot, which must not be always related to pitch direction. This is because one can ascend in pitch, but the pivot motion could be downwards if there is a string crossing while pivoting. In Fig. 59, the application of the pivot technique is an example of this phenomenon. Observe the beginning of the application in which the two back-to-back pivots, or a double pivot, move upward and downwards respectively, but the melodic line

⁴² Marcos Machado, interview by author, Hattiesburg, January 23, 2021

ascends. Later in the excerpt, one finds two single pivots: the first is an upward movement, and the second pivot in the example is a downward motion. Still, the line keeps ascending.

Reduce shifts
to a minimum during
the scalar passages.

Double pivot
(Motion: upwards then downwards)

Pivot
(Motion: upwards)

Pivot
(Motion: downwards)

1 4 1 4 0 1 2 4 1 4 4 4 1 4 2 1 2 4 1 4 1 2

IV ----- III ---- II ----- I ----- II ----- I

The image shows a musical staff in bass clef with a key signature of two flats. Above the staff, fingerings are indicated by numbers 1, 4, 1, 4, 0, 1, 2, 4, 1, 4, 4, 4, 1, 4, 2, 1, 2, 4, 1, 4, 1, 2. Brackets and arrows above the staff highlight specific pivot points: a 'Double pivot (Motion: upwards then downwards)' under the first four notes, a 'Pivot (Motion: upwards)' under the 11th and 12th notes, and a 'Pivot (Motion: downwards)' under the 18th and 19th notes. A large curved arrow labeled 'Reduce shifts to a minimum during the scalar passages.' spans from the beginning of the double pivot to the end of the second pivot. Below the staff, Roman numerals IV, III, II, I, II, I are connected by dashed lines, indicating fret positions.

Figure 59. Pivot technique application in Strauss, *Hero's Life* "The Hero's Battlefield" two mm. after Reh. No. 64.

There are two outcomes of using these pivot techniques in this excerpt. First, both scalar passages in the excerpt are fingered using pivots to reduce shifts to a minimum. For instance, at the beginning of the excerpt one avoids shifts until the minor sixth leap to G-flat. This shortens the technical timing and consequently, it improves the articulation. This is a quality that is relevant to consider because of the martial march-like character of Strauss' music in this section. Second, the shift-less motion helps to ease the intense physical work that Strauss' music demands from the bassist. These long sections of fortissimo character are a common finding in his compositions, and *Hero's Life* is not an exception. Thus, the pivot techniques applied in these contexts improves' the bassist's physical endurance.

In Fig. 60 I selected a section of a *Tao of Bass* exercise, ex. 2.88 *Endurance*, in which the objective is to develop the bassist's physical endurance. This is done through a busy line in 16th notes that requires the application of three distinctive but coexisting left-hand techniques. These are the string crossing action, the four-finger technique, and the pivot technique. In the last written exercise in chapter II of *Tao of Bass*, mastering the techniques mentioned above in coexistence is one of the main goals. Particularly relevant to music example no. 22 is the application of the pivot in such a context. Moreover, the exercise in Fig. 60 creates a sense of a rhythmic progression in the application of the pivot. The first time it is applied as a single pivot and later it is applied as a double pivot consistently throughout the two-bar arpeggio sequence. This progressive and repetitive motion develops a strong muscle memory in the left hand to accurately apply these techniques in coexistence. In addition, the workout for the left hand strengthens the bassist's physical endurance, which is another aspect to master through this *Tao of Bass* exercise.

Exercise 2.88 Endurance

The image displays a musical exercise titled "Exercise 2.88 Endurance" in bass clef, 4/4 time. It consists of four staves of music. The first staff includes two boxes labeled "Single Pivots" and "Double Pivots" with arrows pointing to specific notes. The notes are circled, and the exercise includes various fingering numbers (1, 2, 3, 4) and fret numbers (II, III, IV) written below the staff. The second and third staves continue the exercise with similar fingering and fret markings. The fourth staff concludes the exercise with a double bar line and a key signature change to two sharps (F# and C#).

Figure 60. Pivot technique in *Tao of Bass*, Ex. 2.88, to understand motion direction and prepare endurance in *Strauss's, Hero's Life*.

Gustav Mahler's first symphony is the case of study in music example No. 23. This symphony, also known as *Titan*, belongs to the first period of his compositional style. During this phase he was strongly influenced by folk tunes; thus, these works contain lots of quotations and influences from this style. Music example No. 23 is the beginning of the third movement of the symphony — also known as the *Huntsman's Funeral*. The principal motive in this movement is introduced by a double bass solo (muted) accompanied by timpani. The melody of the solo is inspired by a well-known folk tune, *Frère Jacques*. Although, the tune in the symphony is quoted in a minor version to fit Mahler's programmatic sketch of the symphony.⁴³

⁴³ Preston Stedman. *The Symphony*. (New Jersey: Prentice-Hall, 1979): p.224-231.



Musical Example No. 23. Mahler's, Symphony No. 1, Titan, III mvt. mm. 3-4.

The homophonic texture of this solo is probably one of the reasons why this excerpt belongs to the core of orchestral auditions. Although the double bass solo is rather an easy melody to perform, the delicate simplicity of its melody and harmony raises the challenge of phrasing successfully.

One way to successfully perform Mahler's phrasing marks is to assign a finger pattern that matches the melodic motion of the example. Accordingly, in Fig. 61 the applied four-finger technique articulates in coordination with the stepwise motion of the excerpt. Consequently, this coordination facilitates the performance of the required legato articulation throughout each phrase. The technical reason for this to happen is because the shift-less motion in this coordination coexists within the four-finger and the pivot techniques. Moreover, this is a good example to understand how the pivot technique plays an important role when applied along with the four-finger technique. For instance, in this example, the direction of the pivot is in accordance with pitch direction supporting the idea of a holistic approach when applying the four-finger technique to this passage.

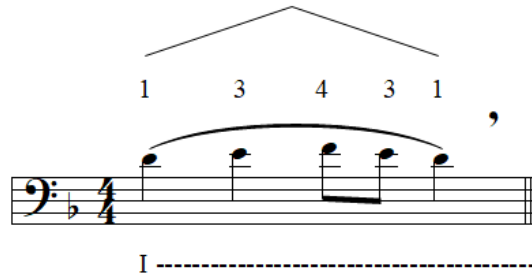


Figure 61. Pivot and four-finger technique application in Mahler's, *Symphony No. 1, Titan, III mvt. mm. 3-4.*

To achieve seamless coordination when applying both techniques simultaneously, I selected a group of exercises from *Tao of Bass* that correlates closely to Mahler's music example No. 23 left-hand technical issues. The exercises selection in Fig. 62 shows Machado's approach to incorporate these techniques in coexistence within the bassist's left-hand technique repertoire. Moreover, not only does he use the same pitch class as in Mahler's example, but also, he explores the different permutations of pitch order and a variety of legato marks permutations. In this way, the bassist can practice and acquire the technique without countless repetitions of the excerpt, while also mapping this area of the neck thoroughly.

Exercise 2.15



Exercise 2.16



Exercise 2.17



Exercise 2.18



Figure 62. Pivot and four-finger technique to train the performance of legato articulation in G. Mahler's, *Symphony No. 1, III mvt.*

In conclusion, the knowledge of this area, the exploration of legato marks permutations, and the application of both techniques in coexistence will help the bassist to play with ease and confidence, which means that both the body and the mind are in harmony. This knowledge is relevant since playing a solo part within the orchestra can be a psychological challenge. I believe that understanding and training thoroughly as described above is a major aid to mastering these musical situations within a professional environment.

The last example of the pivot technique discussion was selected from Johannes Brahms' *Symphony no. 1*. That said, music example No. 24 is a section in the end of the development of the first movement of his symphony — which is an expanded sonata-allegro form. Furthermore, the sequential and chromatic characteristics of this melodic passage makes possible the modulation to Eb minor. From the perspective of the musical phrase structure of the overall form of the movement, this is an important section. However, for the purpose of study in this dissertation the focus of the discussion will be in the sequential characteristic of the melodic material in music example No. 24. The reason to focus on the sequential aspect of this excerpt is because of the parallelism with the structure of many of the *Tao of Bass* exercises. Although both artists clearly had different intentions and purposes in their work, the parallelism comes almost in an intuitive form. This parallelism relies on the idea in which both choose a melodic pattern that is easy to memorize because of its repetitive occurrence. For Machado, the idea of performing a repeated motive is the perfect scenario to extrapolate a fingering pattern.



Musical Example No. 24. Brahms, Symphony No. 1, I mvt mm. 181-3.

In Fig. 63 the extrapolation of a fingering pattern not only reaffirms the sequential aspect in a musical way but also helps to strengthen the muscle memory, and consequently it improves intonation accuracy.

Sequence #2 (extrapolation of the fingering pattern found in Sequence #1).

Sequence #1

Sequence #2

Figure 63. Pivot technique application in Brahms, Symphony No. 1, I mvt mm. 181-3, sequential fingering patterns.

According to Machado, all the “daily” exercises in *Tao of Bass* are the ones that represent the core of the volume.⁴⁴ That is why I selected ex. 2.20 and ex. 2.21(Fig. 64); these belong to the category of “daily” exercises and relate directly with music example No. 24. That said, Fig. 64 is a *Tao of Bass* example of a positive application of the pivot technique while extrapolating a fingering pattern. These two exercises, ex. 2.20, and a selection of its pattern variations or ex. 2.21, work as a unit despite the separate numbering. First, one can observe the extrapolation of a fingering pattern in the square selections of Fig. 64. This extrapolation is cyclical; it happens every three measures in

⁴⁴ Marcos Machado, interview by author, Hattiesburg, January 23, 2021.

correspondence with the half step modulation. The idea of extrapolating a fingering pattern becomes a familiar concept with the deliberate practice of ex. 2.20. Second, when applying the *Patterns* of ex. 2.21, the bassist will explore different melodic contents and their fingering pattern extrapolations to other keys, which will further develop the dexterity of the left hand — an important skill to perform at fast tempos through busy and/or sequential melodies.

Extrapolation of a Fingering pattern
to the same melodic structure in a

Exercise 2.20 Daily Pivot Exercise $\text{♩} = 92-144$

Exercise 2.21 Patterns

Figure 64. Pivot technique in *Tao of Bass*, Ex. 2.20, extrapolation of a fingering pattern.

In conclusion, when mastering the pivot technique, the bassist must be aware of two important positive aspects. The first aspect is that one can reduce shifts while performing. This is especially important when playing fast tempo passages — especially those with sequential nature. For instance, one situation when the bassist can reduce shifts is by applying the pivot technique while string crossing. As discussed above, this combination of techniques can aid the bassist to cope with melodic leaps at fast tempos

by significantly reducing distances on the fingerboard. The second aspect is the diversity of fingering patterns that the bassist can develop and apply while pivoting. When the bassist masters the pivot technique, it will be easier to deal with a musical situation comparable with the music examples discussed. These aspects of the pivot technique are covered in the second chapter of *Tao of Bass*. Through this chapter, one can identify a selection of exercises covering a wide spectrum of approaches related to the application of the pivot technique, alone and combined with others. The idea of adopting in our left-hand technique a diversity of fingering patterns is thoroughly represented in *Tao of Bass* through the permutation of fingering patterns — and this is one of *Tao of Bass* pedagogic pillars.

CHAPTER III - CONCLUSIONS

While searching for ways to establish a parallel between Machado's didactic and other pedagogues' didactic philosophies, I was able to discover a large number of methods that directly or indirectly were didactically parallel to Machado's ideas in *Tao of Bass*.

When comparing Machado's work with the most influential schools of double bass, I found parallelisms throughout. In this regard, there are many double bass schools, but three of them have been the most influential ones: the German School (mainly originated by the Czech School), the Italian School, and the French School. In my conclusions, I would like to highlight five aspects that are parallel to the didactic of Machado with the other double bass schools. This is an important aspect to determine the universality of Machado's didactic in *Tao of Bass*. Consequently, the professional bassist would benefit greatly by incorporating *Tao of Bass* when preparing for professional performances (auditions, solo recitals, competitions, etc.). Additionally, as part of these conclusions I will point out two didactic innovations in Machado's work that were of relevance when applying *Tao of Bass* left-hand techniques in chapter two. In closing, I will address the outcome that the professional bassist gains by incorporating *Tao of Bass* when preparing for professional performances.

a. Parallelisms between didactics

A *Schema of Positions N°1.*

Lagenschema N°1.

I. Lage. 1^{re} position | II. | III. | IV. | V. | VI. | VII. | VIII. | IX.

Position system and fingering pattern from the German School by Friedrich Warnecke (b. 1856 – d. 1931) excerpt from his double method, *The Study of the Double Bass, Part I*, a chromatic nine position system for the lower neck area of the double bass up to the middle G natural harmonic in the first string.

B

	Note naturali	1 ^a pos.	Pos. interm.	2 ^a	3 ^a	Pos. interm.	4 ^a	Pos. interm.	5 ^a	6 ^a	Pos. interm.	7 ^a
	Notes naturelles	1 ^{re} pos.	Posit. interm.	2 ^{me}	3 ^{me}	Pos. interm.	4 ^{me}	Pos. interm.	5 ^{me}	6 ^{me}	Pos. interm.	7 ^{me}
	Natural notes	1 st pos.	Interm. posit.	2 nd	3 rd	Int. posit.	4 th	Int. posit.	5 th	6 th	Int. posit.	7 th

I. CORDA SOL
I. CORDE SOL
I. STRING G

I. | II. | III. | IV. | V.

1/2 pos. | 1/2 pos. | 1/2 pos. | 1/2 pos. | 1/2 pos.

I. CORDA
I. CORDE
I. STRING

Position system and fingering pattern from the Italian School by Isaia Billé (b. 1874 – d. 1961), excerpts from his method, *Nuovo Metodo per Contrabbasso, Part I, Vol. I*, a chromatic position system, (12 positions, 7 over natural notes, and five intermediate positions over altered notes).

C

	1 ^{re} Corde											
	Sol / G	(Cordes à vide)										
	Sol# / La# / G# / Ab	1 ^{re} Position	Notes comprises dans la (1 ^e) position									
	La / A											
	La# / Sib / A# / Bb											
	Si / B	2 ^e Position	Notes comprises dans la (2 ^e) position									
	Do / C											
	Do# / Réb / C# / Db											
	Ré / D	3 ^e Position	Notes comprises dans la (3 ^e) position									
	Ré# / Mi# / D# / Eb											
	Mi / E											
	Fa / F											
	Fa# / Solb / F# / Gb											

1^{re} corde (Sol)(G)

Position system and fingering pattern from the French School by Rabbath (b. 1931), excerpt from his method, *Nouvelle Technique de la Contrebasse, Vol. 1 – 5*, a diatonic three position system and a chromatic fingering pattern.

Scheme 1 Positions systems for the lower pitch area of the fingerboard from three influential schools of double bass: German(A), Italian(B), and French(C).

Traditional left-hand fingering pattern.

Exercise 1.28 Finger Substitution

Figure 65. *Tao of Bass* excerpt, traditional left-hand fingering pattern position, same as in the German and French Schools of double bass. Also, ascending and descending with the traditional left-hand position chromatically, in the same way the three schools do.

The first didactic parallelism I will discuss is the comparison of Scheme 1 with Fig. 65. Here one can observe how Machado's fingering pattern approach for the lower pitch area of the fingerboard is equal to the three influential double bass schools (German, Italian, French).

Second, in *Tao of Bass*, the application of the pivot technique is parallel to other double bass schools' didactics. In Scheme 2, I selected and compared Machado's application of the pivot to three pedagogues that apply the pivot technique on their didactic. One of these is Frederick Zimmerman (b. 1906 – d. 1967), considered the father of the New York School of double bass; he describes a pivot technique without naming it in that way.⁴⁵ Then Rabbath, representing the French School, applies the pivot technique as an integral part of his six position system. Last, representing the modern New York School of double bass is Eugene Levinson (b. 1945 ca.).⁴⁶ In his method, *The School of Agility*, he addresses a type of shift that consists in covering a position plus a half position

⁴⁵ Frederick Zimmerman. *A Contemporary Concept of Bowing Technique for the Double Bass*. (Milwaukee: Hal Leonard, 1966): P. 0

⁴⁶ Paul Brun. *A New History of the Double Bass*. (France : Paul Brun Productions, 2000): p.92.

length without shifting — again, E. Levinson’s argument matches with what Machado considers a pivot motion.

F. Zimmerman, excerpt from his edition of F. Simandl, *New Method for String Bass*, the extended position and pivot (the latter advised to be applied when the extension position is not suitable for the performer’s left-hand dimensions), both indistinctly marked with a dotted bar, and a rare use of the third finger when applying this technique.

Rabbath, excerpt from his method *Nouvelle Technique de la Contrebasse, Vol. 2*, the pivot technique applied to a C major scale. The pivot motion is not marked in the score, but explained in its didactic directions, “play these scales without moving the thumb”.

E. Levinson, excerpt from his method, *The School of Agility*, the pivot technique is marked with a line between fingerings while under a bracket.

Exercise 2.20 Daily Pivot Exercise

Machado’s excerpt from *Tao of Bass*, the pivot technique applied in a sequence of modal tetrachords (Ionian, Eolian, and Phrygian) with tonic in C. The pivot motion is not marked in the score, but rather in the directions.

Scheme 2 Didactic parallelism in the application of the pivot technique with different schools of double bass.

The third didactic parallelism I will discuss in Scheme 2, is the thumb position methodology. In methods like those of Bottesini, Simandl, Warnecke, or Billé, to cite a few, one can find didactic common grounds. All those methods had divided its didactic into two sections, the orchestra school (dedicated to the lower positions of the fingerboard), and the solo school (dedicated to the higher positions of the fingerboard). In a similar fashion, the third chapter of *Tao of Bass* deals exclusively with the thumb positions. That said, in Scheme 3, I compared an excerpt from Warnecke's thumb position system to Machado's. Both authors developed a sequential thumb position fingering pattern that moves chromatically through the higher positions of the fingerboard. In the case of Machado's thumb position didactic, I would say that he advocates for the application of the lower thumb positions more often than Warnecke. In that regard, the latter advocates for the use of the lightly pressed thumb when on a natural harmonic and the thumb fully pressed in an ordinary note —denoting this difference in the score with two different thumb symbols. On the other hand, Machado does not apply this didactic; instead, he treats every sound equally. In accordance with this, Machado only uses one symbol for the thumb consistently as part of his philosophy of simplification of language. Lastly, although both transfer the fingering pattern to new keys chromatically, the technique to perform the transitions between keys is not the same. While Warnecke performs the same finger shift, Machado uses the crab technique. The result is that Warnecke shifts with the same finger to the new position while Machado anticipates the position with the crab technique for the sake of intonation.

Symbol to indicate full pressure when applied over an ordinary note.

Symbol to indicate light pressure when applied over a natural harmonic note.

I. Lago. (Hauptlage)

II. Lago.

A-Saite D-Saite G-Saite D-Saite A-Saite E-Saite

Same finger shift.

F. Warnecke's excerpt from *Ad Infinitum, Vol. II.* the fingering pattern and a position system (eight positions) for the higher pitch area of the double bass fingerboard, starting in the middle of the string where the natural harmonic of G is located and progressing chromatically — where each half step represents a new position structurally equal to the previous.

Application of the crab technique to anticipate the next thumb position.

Same fingering pattern in a one octave major scale.

Exercise 3.93 Major Scales

♩=100

Machado's excerpt from *Tao of Bass*, the same fingering pattern as F. Warnecke for one octave major scale in thumb position in the higher area of the fingerboard. Although Machado uses the low thumb position more often than F. Warnecke, both extrapolate the exact fingering pattern chromatically in their didactic.

Scheme 3. Didactic parallelism in the application of the thumb positions with the German School of double bass.

The fourth parallelism in the didactic for the thumb position relates to the Italian School of double bass (Scheme 4). The Italian contemporary double bass virtuoso and pedagogue, Francesco Petracchi (b. 1937), amid the 20th century developed a didactic for the higher positions of the fingerboard in *Simplified Higher Technique*. This technique compendium for the thumb positions is an effort of Petracchi to establish a set of thumb positions and apply these to any kind of repertoire consistently to simplify the didactic. Moreover, Petracchi created three basic positions and another six as an addition of “extended positions.” In this regard, Machado broadened the lexicon of thumb positions to eighteen positions expanding the application of these.

Machado's first three thumb positions are equal to F.

F. Petracchi's three basic thumb positions: Chromatic, Semi-Diatonic and Diatonic

a. *cr*

b. *s.cr*

c. *diat*

d.

e.

Both pedagogues didactic includes additional thumb positions beyond the basic three. Although, Machado broadened the lexicon of thumb positions to eighteen positions (only two of these additions are displayed in this figure).

Scheme 4. Didactic parallelism in the application of the thumb positions with the Italian School of double bass.

The last didactic parallelism I will discuss is the application of the crab technique in thumb positions (Scheme 5). Since Rabbath coined the concept in *Nouvelle Technique de la Contrebasse, Vol. 3*, and Machado studied with him at L'Institut International de Contrebasse de Paris, it is relevant to compare how these two pedagogues apply the crab technique. This anticipatory technique, as discussed in chapter two of this dissertation, is of great aid to improving intonation and obtaining a seamless stream of sound when performing in legato articulation. In my opinion, Machado applies the crab technique in the same fashion as Rabbath. However, there are subtle differences between both pedagogues. One is that Machado expanded the application by applying the technique more often while string crossing. Second, in the didactic of Machado, the application of a consistent fingering pattern for a crab motion is meant to strengthen the bassist's muscular memory. This is a characteristic that other pedagogues in the string family have noted. A good example of this is the Scottish violist and pedagogue William Primrose (*b. 1904 d. 1982*); when publishing *Technique is Memory*, he addressed a principle to strengthen the visual memory by performing sequential fingering pattern exercises.⁴⁷ In this regard, while innervating equally the bassist's muscular synergy when applying sequential fingering patterns, the motion becomes familiar.⁴⁸ In consequence, this subtle development improves the bassist's learning curve when we apply the technique, allowing one to perform the technique faster and with a high level of accuracy.

⁴⁷ Primrose, William. *Technique Is Memory: A Method for Violin and Viola Players Based on Fingering Patterns*. (London: Oxford University Press, 1960): p.0

⁴⁸ Madeline Bruser. *The Art of Practicing*. (New York: Random House International, 2000): p. 213-221.

Rabbath excerpt from *Nouvelle Technique de la Contrebasse, Vol. 3*, this excerpt constitutes one of the few times he performs crab technique while string crossing (indicated with a circle and a finger), most of the time he performs the technique over a single string.

Exercise A (3)

Rabbath excerpt from *Nouvelle Technique de la Contrebasse, Vol. 3*, a preparatory exercise —A (3)— for the crab technique where one can observe the variety of fingering patterns while applying technique.

Exercise 3.59 Chromatic Etude

Machado's excerpt from *Tao of Bass*, both applied the technique similarly, but Machado applies more often the crab technique while string crossing.

Exercise 3.4 Crab

Machado's excerpt from *Tao of Bass*, the application of a consistent fingering pattern for a crab motion is meant to strengthen the bassist's muscular and visual memory.

Scheme 5. Didactic parallelism in the application of the crab technique.

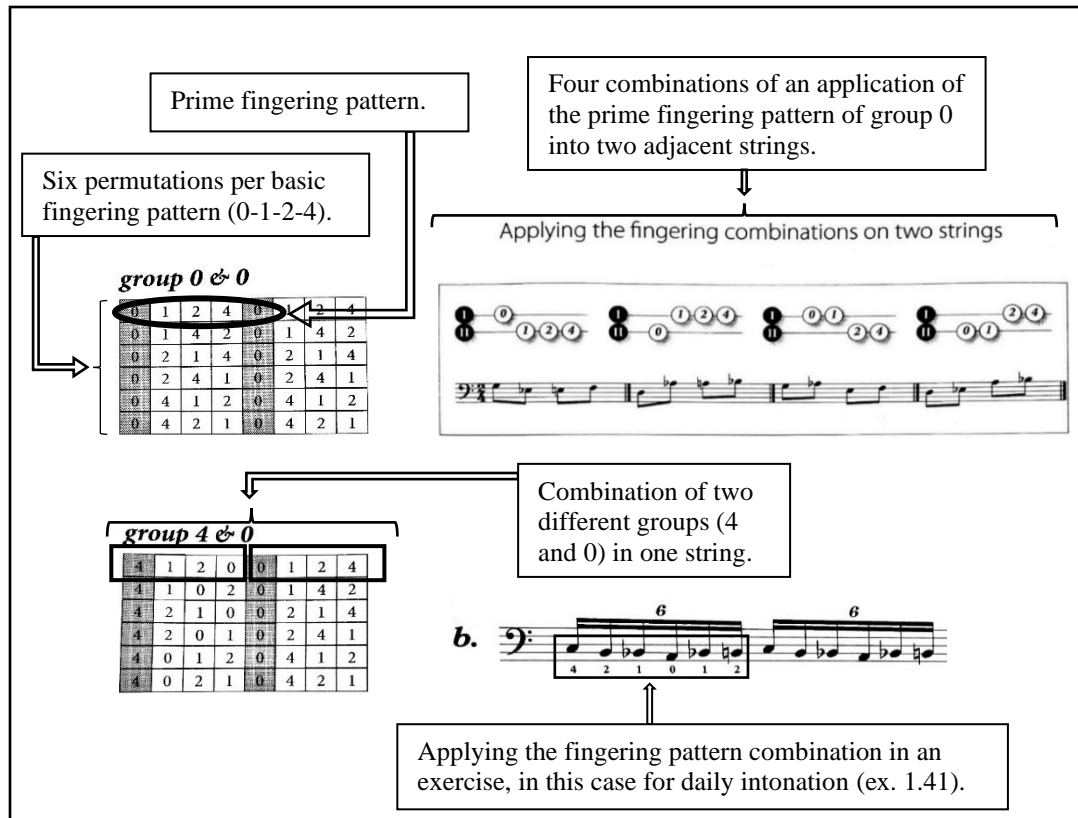
To conclude this section about the didactic parallelisms within pedagogues, one could say that Machado followed the traditions of double bass pedagogy, but also pushed the boundaries of creativity to expand the applications of the left-hand techniques found in *Tao of Bass*. The refinement and development of these didactic tools in his pedagogy prove that the *Tao of Bass* is a didactic publication of utmost relevance for the world of double bass — especially when preparing professional performances.

b. Didactic innovations in *Tao of Bass*

After establishing the didactic parallelisms in *Tao of Bass* with other pedagogues' didactics, there are also differences. In my opinion, two are the most relevant. The first is that Machado consistently applies the four-finger technique along with the pivot technique as an integral technique. The second is Machado's mathematical approach to mapping the fingerboard that aids the bassist in mastering a substantial number of fingering patterns. Consequently, our sight-reading skills and our fingering pattern's proficiency improves. This is because once our muscle memory learns a vast lexicon of fingering patterns, the applications of these have no boundaries to approach any kind of repertoire.

The application of the four-finger and pivot technique, seen as an integral technique, is an original and innovative concept by Machado. Even his teacher, Rabbath, who advocates for the pivot motion as an integral part of his didactic for mapping the fingerboard, does not apply the third finger while applying this technique; hence, his pivot technique for the lower positions of the fingerboard only applies the traditional left-hand fingering pattern (1-2-4). Other authors like Christof Friederich Franke (*b.* 1804 *d.* 1875 ca.) from the German School of double bass, Barry Green (*b.* 1950 ca.), or Murray

The second innovation I will address is Machado's didactic approach when mapping the fingerboard. Machado's position system is innovative and unique, but there are other systems that had a similar approach, and not only in the double bass. For instance, Warnecke's position system was totally chromatic, and the same is true for the position system of the cellist virtuoso and pedagogue Janos Starker (*b.* 1924 – *d.* 2013). However, Machado's has a didactic distinctive mathematical approach that consists in performing all the fingering patterns available in the lower and the higher positions of the double bass by permuting these (Scheme 7). That said, Machado's mapping of the fingerboard is consistently chromatic, and it addresses a position system based in three basic positions of the left hand. The position system is diverse from conventional systems of positions like those of Simandl, Billé, or Rabbath. Instead, each of these three positions have a prime fingering pattern (0-1-2-4, 1-2-3-4, and +-1-2-3) that will be permuted to obtain all the possible combinations. Furthermore, because each fingering pattern has consistently four digits and six combinations are possible within each prime fingering pattern, Machado grouped these in four groups to create combinations within groups. This is why it is possible to permute and combine groups to obtain a greater amount of fingering patterns (Scheme 7). One of the main goals of applying these permutations is focusing on training the inner ear of the bassist with pitch arrangements in correlation with these fingering pattern permutations — such as in scales (diatonic, chromatic, and atonal), arpeggios, sequences, and etudes. In a way, it could be compared to Bottesini's method, where the Italian virtuoso does not address a position system but focuses on pitch arrangements as Machado — although Bottesini's didactic is not mathematically influenced, but rather based on tonal theory.



Scheme 7. Machado position system in *Tao of Bass*.

The didactic to permute and arrange the fingering patterns produced by the permutation of the three basic positions is consistently equal throughout *Tao of Bass*. The second and third basic fingering patterns (1-2-3-4 and +-1-2-3) are represented and explored in *Tao of Bass* with the same methodology as seen in Scheme 7.

c. The outcome for the performer

When researching in *Tao of Bass* the left-hand techniques that would help me to master each of these excerpts, I found two outcomes of studying with *Tao of Bass* that I could extrapolate to any musical situation.

1.Strengthen visual and muscular (kinesthetic) memory.

The didactic of Machado regarding sequential fingering patterns is of great help to the bassist not only to visually identify patterns in the repertoire, but to rapidly associate a sequence with a specific fingering pattern. These two characteristics positively impact the bassist's sightreading skills, overall rhythm, and intonation. In this regard it improves sightreading skills because sequences are easy to detect after mastering *Tao of Bass* left-hand techniques. In the area of rhythm, this sequential application of fingering patterns creates the sensation of a technical pulse or hyper pulse that overlaps the musical pulse. Because the motion of the left hand follows the coherence of the musical pulse while applying a sequential fingering pattern, the bassist's muscular memory improves due to its repetitive nature. Finally, it improves intonation, because when applying a sequential fingering pattern while shifting, pivoting, or crabbing, the finger remains consistent which represents further reference in the fingerboard while performing.

2.Freedom from dogmas to perform fiercely.

One of the outcomes of mastering the left-hand techniques in *Tao of Bass* is to create in the bassist an awareness to apply these according to a musical situation while respecting our own physical virtues and limitations. Accordingly, Machado's didactic proves to be an adaptive technique for which each bassist can apply the one that interconnects best with their physical characteristics. This adaptive characteristic of Machado's didactic approach is crucial to approaching professional repertoire. During my research, this characteristic allowed me to approach each excerpt with a fresh perspective. In other words, by mastering these techniques in *Tao of Bass*, I was able to be creative and technically free from dogmas. This allowed me to choose a technical

approach for each excerpt suiting my needs without impacting the quality of music but rather enhancing it. To cite an example of this process, when performing expressive fingering patterns through the application of the Fan technique, I found common characteristics in other violin family pedagogies. The Hungarian violinist and pedagogue Carl Flesch (*b.* 1873 – *d.* 1944) highlights that the professional violinist needs to have diverse fingering patterns to approach any particular situation accordingly.⁴⁹ These and other didactic parallelisms with other pedagogues as discussed at the beginning of this chapter are consistent evidence that *Tao of Bass* is a didactic work that is universally beneficial to preparing and mastering professional repertoire, no matter its complexity or its historical period.

To conclude, through my research of double bass schools and methods from its early developments until today, I have found a vast variety of approaches and adaptations to left-hand technique for the double bass. In the light of this evidence, it is easy to connect with Dr Machado's philosophies in *Tao of Bass* about using left-hand techniques with freedom from dogmas. This is because the double bass pedagogy's historic and diverse developments show that there is not a perfect left-hand technical solution, but instead, one that fits each bassist the best. As Machado expresses, the professional bassist that is able to master the coexistence of techniques can approach any musical situation with the utmost proficiency and artistry.

⁴⁹ Carl Flesch. *Violin Fingering: Its Theory and Practice*. Reprint, (New York: Da Capo Press, 1979): p.281-316.

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