When Janos Starker Meets Moshe Feldenkrais – A Study of *An Organized Method of String Playing* and the Feldenkrais Method®

By

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A written project submitted in partial fulfillment of

the requirements for the degree of

Doctor of Musical Arts

(Music Performance)

at the

UNIVERSITY OF WISCONSIN-MADISON

2022

Date of final oral examination: 5/3/2022

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Doctor of Musical Arts: Cello Performance

ABSTRACT

In the fulfillment of requirements for the degree Doctor of Musical Arts, candidate Yee Ting Cynthia Yau, under the direction of Uri Vardi at the University of Wisconsin-Madison, submits the following:

I. Written Project:

"When Janos Starker Meets Moshe Feldenkrais –
A Study of *An Organized Method of String Playing* and the
Feldenkrais Method®"

This written project is a study of the integration of Janos Starker's *OMSP* and the Feldenkrais Method, based on my personal experience. Experiments, with illustrations, are suggested to readers for self-exploration and enhancing self-awareness on the sensory level.

II. Sonata Recital, 5/4/2017, The Crossing
    Sonata for Pianoforte and Violoncello in F Major, Op.5, No.1 – L. V. Beethoven
    Tarantella for Cello and Piano, Op.33 – D. Popper
    Cello Sonata in G minor, Op.65 – F. Chopin

III. Solo Recital, 12/2/2017, Morphy Hall
    Suite No.3 in C Major, BWV 1009 – J.S. Bach
    Serenade – H.W. Henze
    Cello Suite No.1, Op.72 – B. Britten

IV. Piano Chamber Recital, 12/8/2017, Capitol Lakes
    Piano Trio in G Major, Hob. XV:25 – J. Haydn
    Piano Trio in D Major, Op.70, No.1 – L. V. Beethoven
    Piano Trio No.1 in D minor, Op.49 – F. Mendelssohn

V. String Duo Recital, 5/8/2018, Morphy Hall
    Sonata in C Major for Two Cellos – L. Boccherini
    10 Duos for Two Cellos, Op.53 – R. Glière
    3 Cello Duets, Op.22, No.1 – F.A. Kummer
    Suite for Two Cellos and Piano – G. C. Menotti

VI. Final Recital, 12/1/2018, Morphy Hall

Suite No.2 in D minor, BWV 1008 – J.S. Bach
Suite per Violoncello – G. Cassadó
Cello Sonata No.2 in F Major, Op.99 – J. Brahms

VII. Lecture Recital, 4/27/2022, Sing Man & Florence Lee/Annette Kaufman Rehearsal Hall

"The Application of the Feldenkrais Method to Janos Starker's *An Organized Method of String Playing Violoncello Exercise for the Left Hand*"

An introduction of the *Violoncello Exercise* and the Feldenkrais Method, an exploration and application of left arm weight, demonstrations of examples from the exercise and orchestral excerpts.

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ACKNOWLEDGEMENTS

I would like to express my deep and genuine gratitude to my supervisor Uri Vardi for providing his invaluable insight, supervision, and suggestions throughout the course of the project. It was my privilege and honor to work and study under his guidance. His vision, sincerity, and passion profoundly inspired me. I am extremely grateful for what he has taught me over the years.

I am extremely grateful to my committee members Dr. John Chappell Stowe, Marc Vallon, Parry Karp, and Sally Chisholm for their keen interest, as well as their brilliant comments and recommendations on the project. I would also like to thank them for allowing my defense be a pleasant one.

Finally, I would like to give my earnest thanks to my family for their continuous support and understanding throughout the work.

Thank you.

GLOSSARY

Acture	A term coined by Moshe Feldenkrais, in lieu of posture, to describe skeletal organization in standing and sitting, that allows movement in any direction without prior preparation.[1]
Kinesthetic	Feedback about the position and movement of the body, provided especially by proprioceptors in muscles and joints.[2]
Muscle Memory	The ability to reproduce a particular movement without conscious thought, acquired as a result of frequent repetition of that movement.[3]
Proprioceptors	sensory nerves located in muscles, tendons, and joints throughout the body that furnish information concerning movements and positions of the limbs, trunk, head, and neck.[4]
Self-image	the perception of self that develops from the actions and reactions in the normal course of experience. It consists of four components that are involved in every action: movement, sensation, feeling, and thought.[5]
Well-organized	In a well-organized body work done by the large muscles is passed on to its final destination through the bones by weaker muscles, but without losing much of its power on the way.[6]

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[1] https://feldenkrais.com/posture-or-acture/
[2] *The Oxford Dictionary of Sports Science & Medicine*, 3rd ed. (Oxford: Oxford University Press, 2007), s.v. "Kinesthetic."
[3] *Oxford Dictionary of English*, 3rd ed. (Oxford: Oxford University Press, 2010), s.v. "Muscle Memory."
[4] https://www.sports-health.com/glossary/proprioceptors
[5] Moshe Feldenkrais, *Awareness Through Movement*, (New York: Harper & Row Publishers, 1977), 3, 10.
[6] Moshe Feldenkrais, *Awareness Through Movement*, 89.

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Introduction

Musicians depend heavily on their bodies as their primary tool. Long hours of practice, repetitive movements, potential overuse of muscles and joints, and stress around performance and competition, make musicians, like athletes, particularly prone to injury. Although pain and injuries may be common among musicians, they are not inevitable; they can be alleviated, resolved, or even prevented if musicians develop greater awareness of how they use their bodies — that is, if they learn to identify, observe, and challenge their habitual patterns and replace them with more efficient ways of moving. This explains why various somatic approaches, such as the Alexander Technique, Body Mapping, the Feldenkrais Method®, and Laban Movement are increasingly popular among musicians.

Somatic approaches to playing involve both cognitive and kinesthetic experiences: observing one's habits, developing awareness of what one is doing and how one does it, and mapping a body image that more closely matches the actual body. When musicians become more mindful of their bodies, their increased awareness can help them make better choices regarding how to execute their actions and motions while playing. The recognition of one's habitual gestures, and the exploration of new possibilities can provide a musician with tools that contribute to more effectively expressing musical intentions and developing a personal sound.

As a cellist who studied both Janos Starker's *An Organized Method of String Playing* and the Feldenkrais Method® with Professor Uri Vardi, I discovered that both approaches are inter-connected and complementary. Janos Starker (1924–2013), a cellist and pedagogue, understood profoundly the physiological aspects of cello playing. I learned that his scientific approach to the instrument could be deepened and enhanced when combined with Feldenkrais. In this paper, I will describe the two approaches and how they can work together. In the hope of helping fellow cellists, I include mini-Feldenkrais-based experiments, which any cellist can explore to improve body awareness and fluidity, as well as my own personal observations and experiences with both methods.

Chapter 1: Janos Starker and *An Organized Method of String Playing*

Cellist Janos Starker (1924–2013), while best known as a performer, dedicated a good part of his life to teaching. As an educator, Starker helped numerous cello students realize their full potential. He made one of the most important pedagogical recordings in 1967, *The Road to Cello Playing,* which explored proper performance of etudes by Friedrich Dotzauer and others. He also shared his teaching philosophy, cello techniques, and views on body-related issues in his publications *An Organized Method of String Playing: Violincello Exercises for the Left Hand* (1965), and in the final chapter of his autobiography, *The World of Music According to Starker* (2004).

Janos Starker, The Cellist

Starker was born in Budapest, Hungary. He started his cello studies with Adolph Schiffer, a student of David Popper. Starker received his formal education at the Liszt Academy of Music in his native city. His first performance in an Academy student recital was in 1936; and at age fourteen, he made his professional debut with Antonín Dvořák's *Concerto in B minor*.

After World War II, Starker became principal cellist with the Budapest Opera Orchestra and the Budapest Philharmonic, but soon moved to Vienna, in 1946. While there, he attended a recital by violinist Yehudi Menuhin that would forever change his approach to playing an instrument and learning music. Starker was puzzled about his observation that as a miraculous violinist, Mr. Menuhin produced (what sounded to him) a cramped and struggling sound, and started to question if he (Starker) understood well enough what he had been doing with the instrument and his body. “I played like a blind man,” he has said. “What happens to the bird who flies and doesn't know how it flies? That's what happens to child prodigies."[7] Following that experience, he began focusing more on the physical, mental, and acoustical principles of playing, acknowledging them as key elements to effective musical expression.

In 1948, Starker left for the United States, where he was soon offered the job of principal cellist of the Dallas Symphony Orchestra. He subsequently moved to New York City, where he served as principal cellist of the Metropolitan Opera Orchestra, and later to Chicago, where he assumed the position of principal cellist of the Chicago Symphony Orchestra. Starker became a professor at Indiana University in 1958, while maintaining an active career as an internationally renowned soloist.

Starker recorded just about every major work in the standard repertoire, premiered works by new composers, and performed thousands of recitals and concerts with orchestras. He was the recipient of the Grand Prix du Disque for his album of Zoltán Kodály's *Solo Sonata* (1948), he also received a Grammy Award for the recordings of Johann Sebastian Bach's *Six Suites for Solo Cello* (1997).

Janos Starker, The Pedagogue

Starker started his teaching career at age eight as a practice companion to a six-year-old girl. Influenced by the scientific approach to playing and teaching by his childhood teachers Imre Waldbauer and Dezsö Rados, Starker was interested in learning every aspect of instrumental playing and music making. He designed both left- and right-hand exercises for his cellist friend,

[7] Margaret Campbell, "Janos Starker: Cello virtuoso whose teaching had as big an impact as his own playing," *Independent*, April 29, 2013, https://www.independent.co.uk/news/obituaries/janos-starker-cello-virtuoso-whose-teaching-had-as-big-an-impact-as-his-own-playing-8595479.html.

George Bekefi, whose “nerves were shot,”[8] making it impossible for him to play. They worked on the exercises for four months, building up Bekefi’s strength and confidence to the point where he could perform small recitals and play in orchestras for many more years.

Interested in influencing future generations, Starker continued as a professor at Indiana University for fifty-four years (1958-2012), teaching his students techniques for overcoming their musical, instrumental, and physical weaknesses. Starker had his own way of defining teaching and coaching. His desire, he said, was to “plant ideas that students can work with the rest of their lives, and to build their own convincing performances.”[9] Starker’s goal, he told Uri Vardi in a 2012 meeting, was teaching as opposed to coaching; the former, he said, was an approach to problem solving that would endure; the latter was to help the student “to prepare a certain given piece so they can go on stage and play … and shine and make the parents proud.”[10] He strove to foster professionalism in his students; he defined a professional as someone who is consistent and knows which solutions to use when resolving problems.[11]

Starker’s systematic approach to learning and teaching led to the publication of *An Organized Method of String Playing: Violincello Exercises for the Left Hand*,[12] and a chapter on mental and physical preparation, published in his autobiography *The World of Music According to Starker*.[13]

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[8] Janos Starker, *The World of Music According to Starker*, (Indiana University Press, 2004), 87.
[9] Katherine Millett, “2006 Education Guide: Born to Teach,” *Strings* 21, no. 2 (August 2006): 71-80. https://global-factiva-com.ezproxy.library.wisc.edu/ha/default.aspx#./!?&_suid=1647575002183069282506 47892473
[10] Uri Vardi, “Janos Starker shares his Teaching and Philosophy,” *YouTube*, April 5, 2012, https://youtu.be/4zxj7K45G8w.
[11] Hamilton Cheifetz, “Starker Teaching Rococo Variations,” *YouTube*, December 26, 2019, https://youtu.be/XZ9JNcrYYJc.
[12] Janos Starker, *An Organized Method of String Playing: Violoncello Exercises for the Left Hand* (New York: Peer International Corporation, 1961).
[13] Janos Starker, *The World of Music According to Starker*, (Indiana University Press, 2004).

An Organized Method of String Playing

The final chapter of Starker's autobiography *The World of Music According to Starker* is a re-publication of the article "An Organized Method of String Playing" (OMSP). It was first published in the book *Concepts in String Playing*: *Reflection by Artist-Teachers at the Indiana University School of Music*.[14] The *OMSP* is a compilation of topics that Starker covered in seminars and master classes over the years. *OMSP* illuminates much of Starker's thinking on the subject of cello playing and teaching. In a mere twenty-two pages he concisely covers most of what he calls "the problems" cellists encounter on a daily basis. Nevertheless, he stresses that "none of the problems discussed are original in either their statement or their solution, they are based on previously known principles."[15] He places these problems into four categories: I. Playing Preparation; II. Right Arm–Hand–Fingers; III. Left Arm–Hand–Fingers; and IV. Musical Application.

In the first category, Starker discusses the topic of how to free the body from physical constraints when playing cello for the sake of better communicating the music. He stresses the use of even distribution of muscle engagement as a way of preventing the flow of energy from being disrupted. He elaborates and gives examples of how to distinguish between using natural weight as opposed to using too much muscular force. Later, Starker discusses the topic of how to shift body weight without losing balance. He illustrates how to stand up from the sitting position without adjusting the position of the feet. Subsequently, Starker suggests the necessity of

[14] Murray Grodner, *Concepts in String Playing*: *Reflection by Artist-Teachers at the Indiana University School of Music*, (Indiana University Press, 1979).
[15] Janos Starker, "An Organized Method of String Playing," in *The World of Music According to Starker* (Indiana University Press, 2004), 273.

controlled breathing and offers exercises so that the breathing will not get in the way when confronting a difficult passage, or an unexpected event.

Starker goes on to describe the importance of anticipation of all actions. He stresses that anticipation is not just physical preparation, but part of the music itself. The mental process of anticipating the start of a phrase, connecting phrases, and physically (bodily) connecting positions is essential to play musically. The physical anticipation of the start of the bow, the speed of the bow, the change of the bow also helps to serve the music better. At the end of his first category, Playing Preparation, Starker talks about the effect of different angles of the cello and length of the end pin. Recognizing the uniqueness of every person, he concludes that whatever position is assumed, the free motion of the arms and the breath should not be interfered with or undermined.

In the second category of *OMSP*, Right Arm-Hand-Fingers, Starker talks about the optimal arm configuration for holding the bow. He explains the use of different muscles and the respective arm alignment in relation to different positions of the bow. When Starker introduces legato bow stroke, he states that attention should be given to the position of the arm at all points of the bow. Through legato bow strokes, Starker demonstrates how the same principles translate to the “spiccato” strokes, which many cellists confuse with the family of “staccato” strokes. Afterwards, he discusses the importance of not tensing the thumb when holding the bow, and he describes the movable quality the thumb should have. He ends this category by encouraging cellists to explore different hard and soft attacks associated with the bow that he compares to the qualities of consonants and vowels.

Starker starts his third category, Left Arm-Hand-Fingers, by explaining the three shapes the hand can assume (backward slant, forward slant, and perpendicular hold) and goes into their uses, advantages, and shortcomings. He then describes the three main hand positions on the fingerboard (four-finger, three-finger, and thumb) and illustrates how his exercises for left hand can help strengthen and clarify the relationship between fingers. He also offers advice on extended positions and placement of the thumb. Later, he explains the mechanism of connecting different positions on the fingerboard and the apparatus of “anticipated” and “delayed” shifts. Starker also encourages cellists to notice how it feels when the right amount of intensity is applied by the playing fingers and the timing for tension release from one finger to another. Toward the end of this category, Starker gives details about the execution of left hand pizzicato, and his approaches to right hand pizzicato.

Starker concludes his treatise with the importance of the sense of rhythm, tempo, moods, and dynamics that could affect the appreciation of music.

Chapter 2. The Feldenkrais Method® for Musicians

According to the Feldenkrais Guild of North America: "The Feldenkrais Method, developed by Moshe Feldenkrais, Ph.D. (1904–1984), is a somatic educational practice informed by his study of child development, combined with his formal training in physics, engineering, self-defense, and martial arts."

"The Method is intended to help people function with greater ease, efficiency, and choice, not by 'correcting' or 'fixing' them, but rather by facilitating their innate capacity to learn. The Method is educational rather than diagnostic or therapeutic."[16]

Moshe Feldenkrais was born in Slavuta, a small town in what is now western Ukraine. He emigrated to Palestine at age 14, and eventually traveled to Paris to complete his education, earning a doctorate in physics at the Sorbonne. This led to a career as a scientist. While in Paris, he discovered judo and became co-founder of the French Judo Association. In the 1940s, he aggravated an old knee injury and was told that the chances of recovery through surgery were slim. Using his knowledge of biomechanics, child development, and martial arts, Feldenkrais decided to heal himself. The experiments he carried out on himself helped him to function again without pain and led to the development of the method that now bears his name.

The Method

Feldenkrais was adamant that his method, although movement-based, was not exercise, but rather was a way of helping people gain self-knowledge.

[16] Feldenkrais Guild of North America: "Standards of Practice" https://www.feldenkraisguild.com/files/standards-of-practice-20220228(1).pdf.

> For many years I have been involved in working with people who have turned to me for help. … I have some difficulty in explaining to my followers that I am not a therapist and that me touching a person with my hands has no therapeutic or healing value, though people improve through it. I think that what happens to them is *learning*, but few agree with this. What I am doing does not resemble teaching as understood at present. The accent is on the learning process, rather than on the teaching technique. After each session my pupils have a new sense of well-being: they feel taller, lighter, and breathe more freely.[17]

The Feldenkrais Method directs participants to become aware of their mind and body, and the way they work together to influence and create movement. Learning takes place through lessons designed to organize movements through development of awareness.

The Feldenkrais Method is taught in two ways: Awareness Through Movement® (ATM) and Functional Integration® (FI). ATM lessons, usually taught to groups and delivered verbally, comprise structured sequences of movements designed to increase awareness. These lessons — of which there are hundreds — are almost always performed slowly and at the student's own pace. ATM lessons are usually done lying down to free the nervous system from the effort of maintaining uprightness.

FI lessons are hands-on, individual sessions in which the teacher's hands guide the student to discover creation of new pathways and new movements. Both ATM and FI provide direct communication with the student's nervous system.

The Principles

The Feldenkrais Method promotes graceful, efficient movement and greater range of movement by increasing the individual's awareness and bringing unconscious behaviors into consciousness. Through exploring more options for freer movement, the nervous system may

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[17] Moshe Feldenkrais, *The Elusive Obvious* (California: Meta Publications, 1981), 7.

then choose to alter or avoid a movement which feels unpleasant or difficult and, conversely embrace movements that are more pleasurable and efficient.[18]

With a background in judo, Feldenkrais was well aware of skeletal contact with the ground, which supports efficient movement in sitting and standing. The emphasis on our relationship to gravity is one of the unique features of the Feldenkrais Method. Feldenkrais stated that there are two types of balance: stable and unstable. He understood that while humans are wired for both, each has its role: “stability increases the feeling of safety,” but too much stability results in rigidity and “difficulty to initiate movement as well as difficulty to be moved.”[19] In *Higher Judo*, he explained that “[the adult standing posture] is essentially a continuous regaining of unstable equilibrium from which the center of gravity is constantly drifting away,”[20] and a higher center of gravity (unstable balance/instability) can facilitate easy mobility and allow a person to make efficient movements in any direction.

Feldenkrais called the ability to move easily without hesitation or preparation “acture,” and he related it to another important concept in the method: reversibility, which he called “the main feature of correct acture or posture in all procedures.”[21] Reversibility, he explained, means that “at every instant or stage of a correct act, it can be stopped, withheld from continuing, or reversed without any preliminary change of attitude and without effort.”[22] Reversibility is possible only when one of fully aware of what one is doing.

The ability to change and improve lies in the capacity to develop an awareness of the whole self. This organic learning is slow, with no judgement or purpose. In *The Master Moves*,

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[18] Feldenkrais, *Elusive Obvious*, 30.
[19] Ibid, 39.
[20] Moshe Feldenkrais, *Higher Judo* (London: Frederick Warne, 1952), 28.
[21] Moshe Feldenkrais, *The Potent Self: A Study of Spontaneity and Compulsion* (California: Frog, Ltd, 2002), 113.
[22] Ibid.

Feldenkrais writes that the best way to learn is to move slowly: "slow [sic] enough for your more slow-acting motor cortex, the part of your brain that organizes action, to catch up with what you are doing."[23] It is at that moment when one knows cognitively and kinesthetically what he/she is doing, that change becomes possible.

The opening sentence to Feldenkrais's book *Awareness Through Movement* reads: "We act in accordance with our self-image." This is a key concept in Feldenkrais: before we can change, we must know ourselves.[24] Self-image — how a person perceives himself as an individual and within society— develops over time. Many human beings stop exploring possibilities after meeting the minimum requirement to survive, and their self-image becomes fixed or unclear.

But no matter how fixed ones self-image or habits, Feldenkrais believed in the capacity to learn throughout ones lives and was ahead of his time in understanding the phenomenon we now call brain plasticity. In *The Elusive Obvious* he wrote: "You can, at any time of your life, rewire yourself ... there is nothing permanent or compulsive in your system except what you believe to be so."[25] When the self-image becomes clearer and more complete, more options are available, and one can move in a more efficient way.

During the self-observation that is central to the method, individuals learn to recognize their habits. Habits are essential for fast and spontaneous movements, but according to Feldenkrais "habits used blindly or as if they are laws of nature, i.e. cannot be changed, are just perpetuated, agreed ignorance."[26] The lack of alternatives can lead certain muscles to overwork, while allowing other muscles, which should be working, to be dormant. This improper

[23] Moshe Feldenkrais, *The Master Moves* (California: Meta Publications, 1984), 9.
[24] Feldenkrais, *Awareness Through Movement*, 3.
[25] Feldenkrais, *Elusive Obvious*, 117.
[26] Ibid, 119.

distribution of effort may result in fatigue and injury. This is why having a variety of options for similar functions is important: choice allows adjustments to different actions and adaptions to different situations.[27]

The ability to differentiate the eyes from the head, and shoulder is also a very important element in the Feldenkrais Method. In his book *Awareness Through Movement,* in a chapter entitled "The Movement of the Eyes Organizes the Movement of the Body," Feldenkrais writes that "the eye movements of many people are not properly coordinated with their muscular activity."[28] He explores, in depth, the idea that learning to move the eyes, head, shoulder, and hip-joints together and independently of each other increases the variety and fluidity of movements, and also broadens reachability.

Why Feldenkrais?

Playing music involves carrying out a series of movements that can express our musical intentions. The execution of technical gestures, the production of a particular tonal quality, and all the subtle expressions required by the music, require good organization of the whole body. Somatic approaches to teaching and performing allow musicians to learn about their bodies, develop a clearer self-image, and make practical applications to their musical expression. The more detailed and accurate the self-image, the more our movements suit our intentions, and the more self can be involved during the making of music.

Most people, though, learn early in life to move in certain habitual ways and then stop learning. This is particularly true of professionals such as musicians, dancers, and athletes, who

[27] Feldenkrais, *Elusive Obvious*, 117.
[28] Feldenkrais, *Awareness Through Movement*, 146.

are trained to use their bodies in very specific ways. Our habits, in turn, actually shape our bodies — in particular the skeleton and bones, which, Feldenkrais observed, then conform "to the continuous movement … through familiarity."[29] By utilizing the nervous system's ability to change and improve, the Feldenkrais Method can help in reconnecting the mind and body, thus allowing the body to move with greater efficiency, range, and ease.

[29] Feldenkrais, *Elusive Obvious*, 123.

Chapter 3: The Meeting of Two Methods

Through my study of both the Feldenkrais Method and Starker's methods, as outlined in *An Organized Method of String Playing* (*OMSP*), I have discovered that the work and thinking of these two men overlap and complement each other in remarkable ways: Starker intuited (and experimented, presumably on himself) certain elements that contribute to efficient and easy action. He did this primarily for playing the cello. Nevertheless, the principles he espoused are more broadly applicable — even to actions as "simple" as sitting in a chair or walking. Feldenkrais developed a Method that is less preoccupied with how best to perform a given task and more interested in how to achieve an optimal relationship with our bodies and how they function in the environment of gravity where all movements and learning take place.

Both theories preached the importance on the awareness of one's intention – how to achieve even distribution of muscular effort and without excessive effort (what Feldenkrais called "parasitic movement"); the role of breathing and the necessity to practice breathing so one can adjust to the task at hand; preparations before performing a movement; awareness of orientation and location of the body and all its parts (kinesthesia); and rhythm and timing. They also pursued flexibility in the brain for the ability to find new pathways that interconnect, so that a change can be sensed, felt and observed.

OSMP, though only twenty-two pages long, concisely covers most of what Starker calls "the problems" cellists encounter on a daily basis. He places them into four categories: I. Playing Preparation; II. Right Arm–Hand–Fingers; III. Left Arm–Hand–Fingers; and IV. Musical Application. I have framed this chapter around Starker's first three categories; I then go on to describe how, in my experience, both *OMSP* and the Feldenkrais Method improve efficiency and expressiveness through the development of increased awareness.

3.1 Category I: Playing Preparation

In *OMSP*, Starker suggests that elegant, virtuosic playing involves the use of "minimal energy to supply the physical needs of playing an instrument."[30] This idea of using minimal energy, which he called "relaxed playing," is achieved by thoughtful planning and anticipated coordination of different parts of the body, which is why mindful preparation is essential. He puts great emphasis on use of the muscles, the application of power and weight, the control of motion, balance, breathing and timing, the concept of anticipation and delay, and instrument positioning. He further describes his ideal of relaxed playing as "the even distribution of muscle tension."

This mirrors Feldenkrais's idea that in order to attain maximum power with minimal effort, one must know where the source of power is located and how the power is being transferred. In *The Master Moves*, he states that "the body is constructed so that the powerful part, in which all the strong muscles work, and carry your weight, is the pelvis."[31] The lower back muscles and the pelvis are the largest and strongest in the body and serve as our main structural support. Due to its centrality in the body in relation to gravity, the lower back also helps to transfer energy from the feet on the ground through the spine to the upper limbs. The ability to engage the lower back, therefore is important in supporting a variety of movements in the upper body. As a cellist, the upper body may seem to account for most of the movements

[30] Janos Starker, "OMSP," 274.
[31] Feldenkrais, *Master Moves*, 39.

associated with playing. However, as Feldenkrais suggests in *The Potent Self*, "the power of a body is determined by the power of the lower abdomen and more generally by the pelvic region."[32]

In order to not employ excessive muscular force to produce sound, a cellist's movements need to be supported by the lower part of the body, yet many players lack an awareness of this region as a resource. Rather than differentiating and employing different parts of the back (which can loosely be described as having upper and lower regions), people use the back as one unit. The ability to differentiate, integrate, and activate different parts of the back at will is essential to achieve flexibility and power.

In a typical Feldenkrais Awareness Through Movement (ATM) lesson, exploration of the pelvis, low back, and upper back is done lying down. My Experiment 1 (P. 23) uses the same principles, in sitting, to explore the independent functioning of the upper back and lower back.

Many cellists, especially when sitting with the instrument, have the entire lower back and pelvic area stuck and immobile, as though that region is used only for supporting the weight of the body into the chair. Such a rigid posture may cause disorganized movement in the upper body or injury to the lower back. According to Feldenkrais a flexible pelvis contributes to freedom in the upper body:

> No correct posture or *acture* is possible without the pelvis being able to move freely in all its articulations; that is, in the hip joints and in the small of the back. As soon as one of the possible motions of the pelvis is restrained, the fluency of action is broken. Thereafter, great efforts in the shoulder girdle or in the legs are necessary to accomplish what can be done with grace and ease when pelvic mobility is unhampered. Moreover, no exertion can replace correct pelvic motion as far as the quality of action is concerned.[33]

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[32] Feldenkrais, *Potent Self*, 189.
[33] Ibid.

Gaining the ability to sense the location of the source of power in the body and learning to apply it to always changing playing positions is particularly important (Experiment 2, p.24), according to Starker. He mentions that the "ability to apply power to the changing needs of playing high strings, low strings, high positions, and low positions requires the ability to shift the body weight without losing control, ipso facto, balance."[34]

Balance here refers to dynamic balance — the ability to remain stable while changing positions. In a 2001 master class at Seattle's Benaroya Hall, Starker reminded those present to "keep the body position as flexible as possible, and do not sit as if you are cast in concrete."[35] This coincides with Moshe Feldenkrais's concept of "acture" — a term he coined and which he preferred to *posture*, which implies static uprightness. In *Body and Mature Behavior*, Feldenkrais defined acture:

> And this is: (1) that the proper posture of the body is such that it can initiate movement in any direction with the same ease; (2) that it can start any movement without a preliminary adjustment; (3) that the movement is performed with the minimum of work, i.e., with the maximum of efficiency.[36]

It is ideal to be able to react appropriately to any situation at any given moment without the need to apply extra effort. This can be achieved through a posture which adheres to the laws of nature — a well-organized "skeletal structure [that] counteracts the pull of gravity, leaving the muscles free for movement."[37]

When sitting, both Starker and Feldenkrais agree that the placement of the feet is especially important: feet function as a foundation that transmits power from the ground to the

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[34] Starker, "OMSP," 276.
[35] Tim Janof, "Master Class Report," *International Cello Society*, accessed March 17, 2022, http://www.cello.org/Newsletter/Articles/starkermc1.htm.
[36] Moshe Feldenkrais, *Body and Mature Behaviour; a Study of Anxiety, Sex, Gravitation & Learning* (New York: International Universities Press, 1950), 104.
[37] Feldenkrais, *Awareness Through Movement*, 68.

entire skeleton. Starker, in an interview with the cellist Paul Katz, suggested that tension in the upper body, was often caused by the lack of support from the feet.[38] Firmly grounded feet will let the body move with security and stability; different contact points of the feet with the ground give distinct results as to how supportive and free one can feel. (Experiment 3, p.25; video example 1)[39] Dynamic support from the feet functions like a steering wheel for the shifting of body weight between left and right, and front and back, as well as the fluent change between lower positions and higher positions on the fingerboard, and between lower and higher strings. (Experiment 4, p. 28) In short, support through the feet and suppleness of the pelvis allow the upper limbs to move smoothly and efficiently (Experiment 5, p. 29), thereby freeing the upper extremities (shoulders, arms, elbows, wrists, and fingers) to perform actions that require accuracy and power.[40]

Starker says that "relaxed playing is, in reality, the even distribution of muscular effort."[41] Therefore, to remain "relaxed" when playing, the muscles of the arms should remain as a medium to transmit power, but not to create force. The power of the arms must originate in the back muscles.[42] The weight of the arms alone, or the force initiated locally, from the limbs, is not enough to produce a full sound from the instrument.

To maintain a smooth energy flow, Starker mentions that "we should attempt to avoid angular formations (where joints meet) and to create the feeling of curves" in the arms.[43] Angular movement can be usually observed when the change of angle in motion happens only around a particular joint. This kind of movement will result in concentrated tension of the

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38 Cellobello, "Janos Starker on Releasing Tension," *YouTube*, April 23, 2015, https://youtu.be/TG4GU_BoX98.
39 Cellokratzer, "Janos Starker and his Organised Method of String Playing including a Complete Cassado-Suite," *YouTube*, July 29, 2013, https://youtu.be/Z6f5kcjIq6I.
40 Feldenkrais, *Awareness Through Movement*, 89.
41 Starker, "OMSP," 275.
42 Ibid, 274.
43 Ibid, 275.

respective muscles. This aligns with Feldenkrais's idea that "the muscles of the limbs are intended to direct their movements accurately, while the main power of the pelvic muscles is conducted through the bones of the limbs to the point at which it is required to operate … forces working at an angle to the main path cause damage."[44]

For example, if you turn your palm from facing the ceiling to facing the floor (pronating), the elbow, shoulder, and/or back can all initiate and be involved in this movement. However, if pronating the palm is done only from the wrist or elbow, the muscles located closest to these areas may feel overworked and tensed, and the action may look clumsy and robotic. If the turn is originated from the back (shoulder blade), it will allow a larger range of motion without tensing the arm muscles. Arm movements (especially rotation) initiated further away from the contact point between the hands and the string or the bow, will allow a smooth and circular action to occur, with no unnecessary effort needed for the weight and power to be transferred to the instrument.

At the end of this category, Starker encourages cellists to experiment with different cello alignments, chair heights, and end-pin length. He stresses several main points that should not be compromised when undertaking these experimentations:

> Therefore, the summation is that whichever end pin is used, it should not hinder the free motion of the arms. All positions should be within reach without the need to alter the body position. The instrument should not interfere with free breathing. The cello should be positioned in such a way that the knees can move it left and right without the upper half of the body moving.[45]

While the sitting position for playing cello may vary from person to person, these principles should not be compromised. This aligns with the Feldenkrais Method's focus not just on organization and awareness of the body, but also of organization as it relates to the

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[44] Feldenkrais, *Awareness Through Movement*, 89.
[45] Starker, "OMSP," 278.

environment (in this case, the chair and the instrument). "Poise or improvement cannot increase, nor even persist for very long, unless one alters the environment so that the old habitual response is not reinstated."[46] Trouble, according to Starker, comes from leaning toward (pressing) the cello with the chest, bearing the weight of the instrument with the help of the neck, shoulders, and arms, or rounding the back to hug the cello. These postures will disturb the flexibility and range of motion of the arms.

"Sitting up straight" is another common notion in the discussion of "proper" sitting. Very often cellists interpret "sitting up straight" as arching the low back to straighten the natural curves of the spine. This fights anatomy. The human spine has naturally occurring curves to allow flexibility. When we speak of standing or sitting up straight, according to Feldenkrais, "we almost always mean vertical. "But if we look at the ideal skeleton … we shall find only two small sections that are ranged more or less vertically: the top vertebrae of the neck and the vertebrae between the chest and hips."[47] Rather, he believed, a well-organized skeleton is one that is aligned in a way that the vertebrae of the neck, middle spine, and low back are stacked up, but still able to move independently in response to the demands of the moment.

It was evident to both Starker and Feldenkrais that a proper dynamic setup of the body in sitting contributes not only to fluent movement, but also to uninterrupted breathing. Feldenkrais observed that "holding the breath is the clearest observable sign of incorrect posture or acture."[48] The action of inhaling and exhaling should not require much effort; when every part of the body is well organized, uninterrupted breathing occurs naturally, resulting in freer movements and, for musicians, more expressive music making. However, when one feels anxious, one tends to stop

[46] Feldenkrais, *Potent Self*, 183.
[47] Feldenkrais, *Awareness Through Movement*, 67.
[48] Feldenkrais, *Potent Self*, 114.

breathing. Feldenkrais explained that "habitual faulty holding of the breath is normally found together with muscular excitability, and vice versa."[49] A similar experience of interrupted or stopped breathing often happens when learning new patterns of movement or playing too quickly. Breathing therefore, according to Feldenkrais, reflects every emotional, mental, and physical effort in the body.[50] A sudden change of events (physical, or emotional) may alter the way one breathes; the change of breathing can be positively used to express musical character or moods.

Starker related this controlled breathing to an anticipatory beat, a preparation beat that is a part of the music.[51] A good tone also relies on free, uninterrupted breathing. When breathing reflects the character of the music that follows, anticipations of changes produce musical fluency: a sense of meter and pulse happen automatically.

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[49] Feldenkrais, *Potent Self*, 115.
[50] Feldenkrais, *Awareness Through Movement*, 37.
[51] Hamilton Cheifetz, "Starker teaching Brahms Sonata in E minor," *YouTube*, July 6, 2020, https://youtu.be/DSYtuCDSqHs.

Supplementary Experiments

When doing these experiments, always return to the neutral starting position between each movement.

Experiment 1: Differentiating parts of the back and torso

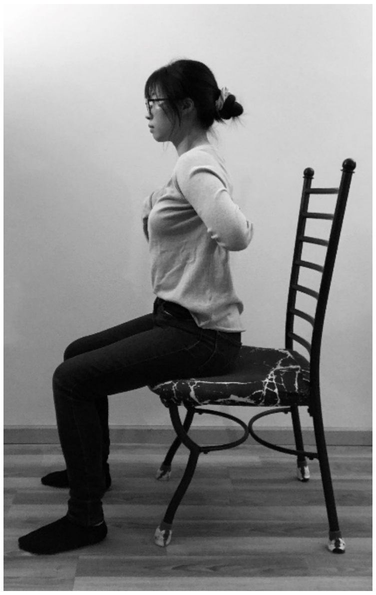

Figure 1: Hands on chest and back.

Figure 2: Round the back.

Figure 3: Arch the back.

1. Place your feet flat on the floor, about shoulder-width apart.
2. Place the palm of a hand on the chest, and the other hand on the upper back opposite to the hand on the chest. (Fig. 1)
3. Round the back and walk the hand on the back down to feel the vertebrae of the spine. (Fig. 2)
4. Round the back with the hand touching the back.
5. Arch the back and walk the hand on the back down to feel the vertebrae of the spine. (Fig. 3)

6. Arch the back with the hand touching the back.

Experiment 2: Recognizing the Source of Power

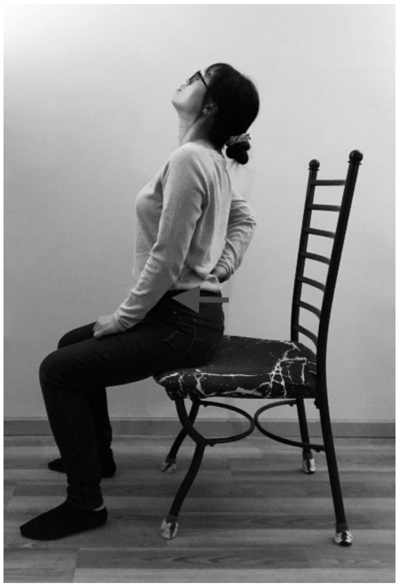

Figure 4: Fist on the back.

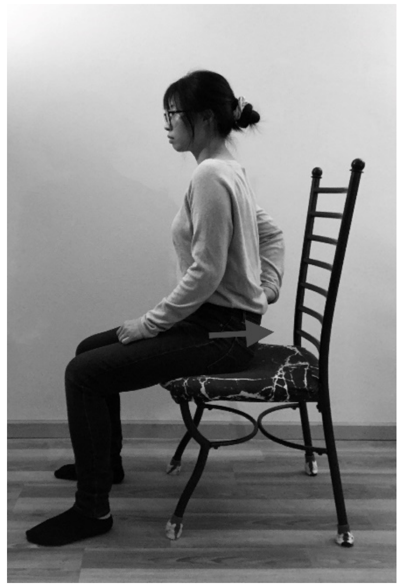

Figure 5: Lower back sink in.

1. Place your feet flat on the floor about shoulder-width apart.
2. Place your fist against the lower back, relax the head, inhale, and arch the back. (Fig. 4)
3. Exhale slowly, keep the stomach relaxed, and allow the upper back to lead the body to sink into the fist.
4. Arch the back again and then allow the lower back to lead the body to sink into the fist. (Fig. 5)
5. Push into the fist with the lower back and notice the feeling in the heels.

Experiment 3: The balance of the feet

Figure 6: Feet shoulder-width apart.

Sit on the front edge of your chair. Without the cello, place your feet flat on the floor about shoulder-width apart. Lean forward and notice how your weight shifts onto the feet. (Fig. 6)

Variation 1

Figure 7: Wide feet.

1. Move the leg as far apart as possible with the soles flat on the floor, then lean forward. (Fig. 7)
2. Maintain the distant of the feet while experimenting with placing on the floor only the inner edges of the feet, the outer edges of the feet, the front of the feet, only the toes, only the heels, or left heel and right toes, or right heel and left toes on the floor while leaning forward.

Variation 2

Figure 8: Closed feet.

1. Place your feet back in the starting position.
2. Move the heels toward each other with the soles flat on the floor and lean forward. (Fig. 8)
3. Experiment with placing only the inner edges of the feet, outer edges of the feet, the front of the feet, the toes, only the heels, left heel and right toes, or right heel and left toes on the floor while leaning forward.

Variation 3

Figure 9: Move the right leg.

Figure 10: Move the left leg.

1. Place your feet back in the starting position.
2. Keep one foot in the current position while moving the other foot forward and back — toward and away from the chair — then lean forward. (Fig. 9)
3. Switch legs. (Fig. 10)

Remarks: Experiment also with placing feet and legs at different distances from each other to find the optimal distance with greatest support.

Experiment 4: The movable pelvis (extracted from *ATM* Lesson 6: "Differentiation of Pelvic Movements by Means of an Imaginary Clock")[52]

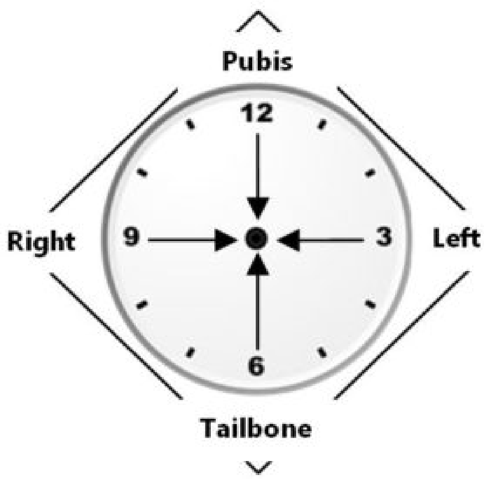

Figure 11: Pelvic Clock.[53]

Figure 12: Feet shoulder-width apart.

Figure 13: Move pelvis with torso.

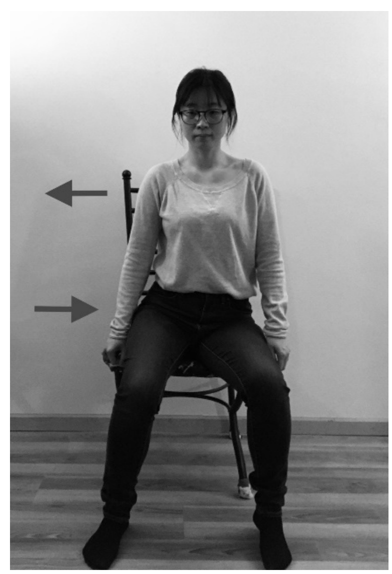

Figure 14: Move shoulder without moving pelvis.

[52] Feldenkrais, *Awareness Through Movement*, 115.
[53] https://annwestyoga.com/spinal-stability-exercises-3/.

1. Sit on the front edge of your chair. Place your feet flat on the floor about shoulder-width apart. (Fig. 12)
2. Imagine the pelvis is sitting on a clock (Fig. 11): 12 o’clock is in front, at the pubis; 6 o’clock is behind you, near the tailbone; 3 o’clock is on the left; 9 o’clock is on the right.
3. With or without the cello, move the pelvis and the whole torso to the left (3 o’clock). (Fig. 13)
4. Keep the pelvis over to the left and move only the shoulder back toward the center. (Fig. 14)
5. Repeat 3 & 4 to the right (9 o’clock)
6. Move only the pelvis without the torso.
7. Circle around the dial of the clock. Start by tilting the pelvis to the left (3 o’clock) then to 12 o’clock (front), then right to 9 o’clock, and back to 6 o’clock (back). Keep circling slowly, explore each digit between these four directions in small increments.
8. After making a few circles in one direction, change the direction of the pelvis.
9. Combine the movements of Experiment 3 with the pelvis movements.

Experiment 5: Identifying the difference between firmness and rigidity

Variation 1

1. Sit on the front edge of your chair. Place your feet flat on the floor about shoulder-width apart.
2. Shift your weight forward and back, then right and the left.
3. Circle the pelvis slowly, clockwise or counterclockwise, as you did in Experiment 4.

4. Now tighten the thighs and the calves and repeat steps 2 and step 3. Notice how this restricts the movement of the pelvis.

Variation 2

1. Sit on the front edge of your chair. Place your feet flat on the floor about shoulder-width apart.
2. Lift the right arm as you would to draw the bow across the strings.
3. Draw a circle with the right arm in a counterclockwise direction.
4. Keep moving the arm while allowing the pelvis to circle together with the movement.
5. Now tighten the thighs and the calves and continue moving the arm.

Experiment 6: Shifting from sitting to standing

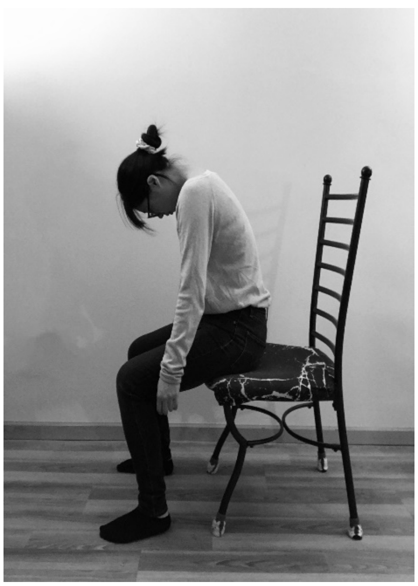

Figure 15: Roll the back.

Figure 16: Weight on feet 1.

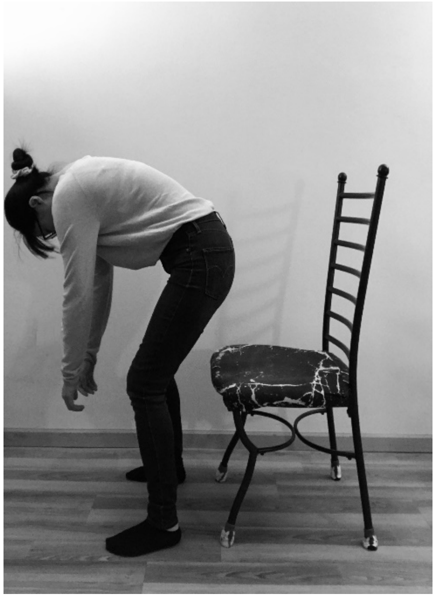

Figure 17: Weight on feet 2.

Figure 18: Stand up when ready.

1. Sit on the front edge of your chair. Place your feet flat on the floor about shoulder-width apart.
2. Bring both shoulders as close to the ears as possible.
3. Slowly relax the shoulders and place both arms either on the side or between both legs.
4. Relax the head and slowly round the back. (Fig. 15)
5. Keep rounding until you feel your pelvis lighten on the chair and start to bring your weight over your feet. (Fig 16, 17)
6. Relax the thigh muscle, unlock the knees, and allow the weight to drop to the heels.
7. Stand up when ready. (Fig. 18)

Variation 1

Repeat Step 1 to 3.

4. Tighten the thigh muscles and try to stand up.

Variation 2:

1. Sit on the front edge of your chair. Place your feet flat on the floor about shoulder-width apart.
2. Tilt forward but keep the head straight.
3. With or without tightening the thigh muscles try to stand up.

My Experience

For much of my early musical training, when instructed to experiment with different possible movements and body organization for executing my musical intentions, I was not aware and did not pay attention to what I was doing. My actions were automatic and mostly relied on muscle memory. After I learned with the Feldenkrais Method, I began to observe more closely my physical movements during playing. I now realize that most of my movements were habitual and not mindfully intended for the musical outcomes. While I was conscious that I was doing something, I wasn't always aware of what I was doing and how I was doing it. Feldenkrais explains: "There is a difference between consciousness and awareness … I can walk up the stairs of my house, fully conscious of what I am doing, and yet not know how many steps I have climbed … Awareness is consciousness together with a realization of what is happening within it or of what is going on within ourselves while we are conscious."[54]

Repetition is an essential part of practicing; I now know that mindful repetitions, as opposed to the kind of mechanical, mindless repetition I was doing before, is the key to achieving a desired musical outcome. In the mindful process, the emphasis is on experimenting

[54] Feldenkrais, *Awareness Through Movement*, 50.

with new possibilities. In this process, new neural connections are made which improve the accuracy of my body image, thus allowing my nervous system to automatically choose an effective option when a similar situation occurs while playing.

Feldenkrais's idea of increasing self-awareness for the sake of minimizing effort matches Starker's idea of using minimum effort to attain maximum power. The unquantifiable nature of effectiveness was confusing to me at first, but later became one of the most fascinating ideas in my explorations. Knowing that exploration is an endless process that will always yield new discoveries made it easier for me to be at peace with my current state.

I learned that developing awareness is more than what we commonly think of as paying attention. The Feldenkrais Method uses particular strategies for developing awareness. During the scan at the start of every ATM lesson, we learn self-awareness by closely sensing how we are supported by the ground and how we perceive ourselves — what Feldenkrais calls our self-image. We learn to recognize which parts of the body feels less obvious and clear in our body perception. Throughout the lesson, awareness is enhanced by moving slowly and keeping movements small and within an easy, comfortable range. This gives our brain a chance to sense and feel changes.

In ATM lessons, we also use imagination to develop awareness: one can imagine a movement more easily when one is free from physical constraint. The same areas in the brain are activated when imagining a movement as if one has physically performed the action, which explains why a movement can become smoother with fewer physical repetitions. After imagining, it is easier to experience the actual (physical) movement: the range, the velocity, and the ease or difficulty.

My ability to flexibly move the pelvis and employ power from my lower back was an important part of my understanding of Feldenkrais's term acture, which is related to Starker's emphasis on utilizing the powerful back muscles to provide power for cello playing. However, the identification of my lower back — and in particular how to initiate power from it — was a long process for me. For a long time, when having ATM lessons, my image of my back was vague. I knew it felt tense, but that was it. I achieved improvements in my body image after doing ATM on the floor, however, translating that sensation as I went from lying down to sitting was challenging. I found that additional help of my hand was very useful in reproducing a similar sensation. Walking with my hands through the chest and the spine helped me differentiate between my upper and lower back. It had also generated a feeling of engagement in areas that were not active before (Experiment.1, p. 23).

While sitting with the cello, it was particularly difficult for me to initiate power from my lower back. My biggest challenge was to acquire a clear sense of "dynamic sitting" in which the relationship between my body and the cello remained unchanged, but the contact of my body with the chair could constantly change. To me, the reluctance to "let go" was the constraint. The asymmetrical set-up of holding cello added to the struggle. I observed and recognized my habits of trying to support the weight of the cello with the chest and hug the cello with a slightly hunched back. Tension in my stomach was therefore built up to stabilize my body. While this acquired stability was helpful when I was not moving, it prevented me from moving freely and smoothly while playing. Practicing sitting with the cello while tilting the pelvis slowly side to side in small incremental movements helped me learn to release the tension in my stomach. (Experiment 5, p. 29) My body learned to rebalance and stabilize without resorting to muscular power.

This idea of a free, movable pelvis seemed to contradict my understanding of the feeling of being “grounded.” I initially interpreted the idea of being “grounded” as a prerequisite to producing a full sound. My early kinesthetic interpretation of this “requirement” was to hunch my back, slightly lean backwards, and bring more weight on to my sit bones (the base of the pelvis). I was able to gain a bigger sound by pressing myself hard into the chair, but the outcome was a compressed sound produced by muscular force from the arm and was not pleasant. I eventually discovered that a flexible pelvis, and a firm connection through the feet, enabled me to be fully supported by the chair (grounded) while providing more power to my arm without forcing.

My first taste of feeling grounded, but not rigid was while learning to go from standing to sitting, and vice versa (Experiment 6, p. 30). I realized that if I performed small, easy, swinging movements while shifting my weight to different parts of my soles, instead of bracing to accomplish the “goal” of standing up, or sitting down, the firmly placed feet gave me the freedom to bring my body weight precisely into the desired part (feet for standing, and pelvis for sitting). Gradually, I realized that feelings of lightness and grounding can co-exist. Following this, I started searching for similar sensations of being grounded and simultaneously feeling light and free, while playing my cello. During this process, I realized how important it was to attend to the placement of the feet to feel grounded while the upper body is constantly moving (Experiment 3, p. 25).

The exploration of the placement of the feet was the most interesting experiment for me. My first experiment was to play the cello with feet lifted off the ground. As absurd as it might seem, the experiment revealed that my sound production and the sound quality did not change when my feet were in the air. This proved to me that my feet — as I was then using them —

didn’t help my playing. My legs and feet were physically present but were inactive; once I learned to shift weight into different parts of the feet, I was able to improve the control of my sound quality and musical expression.

3.2 Category II: The Function of the Right Arm (Bow Arm)

In a master class at Portland State University, in 2006, Janos Starker specified that the “bow could not sing” if the arm is lifted improperly — i.e., without using the back — as this produces tension in the shoulder and the neck.[55] As the arm is attached to the back through the shoulder blades, the source of greatest power is generated from the large structures of the back, pelvis, and legs. It is therefore important to have an undisturbed pathway for the force to be transferred. When holding the bow on the string, the arm is in a downward form. Lifting the bow to put it on the string can cause excess effort, while employing a “dropping” gesture, allows a sensation of complete release. To get to this position, one can imagine making a butterfly stroke.[56] Starker demonstrated this action in his master class. (Video example 2)[57] Ideally, this backward swinging movement can be done without any unnecessary tension in the upper arm and shoulder, allowing a natural rotation in the shoulder.

Using the bow involves opening and closing of the arm. For the weight to be successfully transferred to the bow, the elbow, the wrist, and the fingers all must have to be well organized. The further away from the frog the bow arm moves, the more weight is needed to sustain the same amount of force into the strings.[58] To accomplish this, the entire arm needs to add a

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55 Hamilton Cheifetz, “Janos Starker teaching Haydn D Major Concerto,” *YouTube*, April 30, 2020, https://youtu.be/TvxLqmVxkYY.
56 Janof, “Master Class Report.”
57 Cellokratzer, “Janos Starker and his OMSP.”
58 Starker, “OMSP,” 279.

rotation (pronation) to the extending movement (Experiment 9, p. 44). Feldenkrais, in an ATM lesson in *The Master Moves*, guides his students through an exploration of the relationship between the hand, wrist, elbow, arm, and shoulder:

> [Lie on your front on the floor and] lift your elbow, and you'll see that your elbow does not want to move unless you do something with your hand so that it's comfortable, and if you go fast, you won't notice what you actually did with your shoulder blade, and your clavicle, and you think you did the movement with the elbow… Now very slowly, lift your elbow to the point where you feel it's getting more difficult. Try at this point to lift the wrist from the floor without changing the position of your elbow. Lift the lowest part of the wrist off the floor first, and then lift your fingers, with the wrist down, and you'll find out how much useless tension there is in your hand which makes your shoulder difficult to move.[59]

These movements of the arm while lying prone on the floor, closely resemble what happens when sitting and holding the bow. In a master class at the at the Emil Friedman School in Caracas, in 1993, Starker taught the correct alignment of the elbow in order to allow the power to transfer to the string.[60] The elbow has an optimal position to link the upper arm and the forearm, and at the same time to allow the opening and closing of the forearm. The optimal organization of the elbow would allow the weight to transfer uninterruptedly from the upper arm to the bow (Experiment 10, p. 45).

To organize the bow arm action with specificity, it is good to focus on different parts of the arm while using different parts of the bow. When using the lower third of the bow (around the frog) it is useful to attend to movement of the upper arm (from the shoulder girdle). When using the middle third of the bow, there is a combined action by the upper arm and forearm. The upper third of the bow would involve mostly a movement of the forearm from the elbow, down to the hand and fingers.[61] In order to allow the sound to sustain around the upper portion of the

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[59] Feldenkrais, *Master Moves*, 54-55.
[60] German Marcano, "CEF 4," *YouTube*, February 13, 2014, https://youtu.be/xco3RC4Dqlg.
[61] Starker, "OMSP," 279.

bow, it is important to allow pronation to occur, and to stabilize the wrist to allow the passage of force to reach the contact point of the bow with the string. While we artificially divide the bow into three parts, in reality the passing of arm weight from the upper arm to the forearm to the fingers happens gradually, transitioning smoothly from one part of the bow to another. Therefore, the middle part of the bow has to be reserved for movement in the elbow, which facilitates the linkage between the upper arm and the forearm.

All this technique, of course, must serve the music. To make music with the cello, correct use of the bow is the main tool. Inefficient and ineffective use of the bow arm will, therefore, affect musical expression. The vagueness of the use of the bow arm may also cause physical struggle while playing. To minimize the effort needed to obtain a desirable sound, it is important to know with specificity how the bow arm and bow relate to the strings.

In section 3.1, I focused on how a well-organized body can generate the power that the arm needs to create a desired sound. The production of a good-quality tone depends on effectively using both the power of the entire body and the natural weight of the arm. Applying the natural weight of the arm to the bow means that no muscle along the arm, shoulders, and upper back will stiffen and work contrary to the direction of the weight toward the contact point of the bow with the string. When achieved, this is sensed as complete relaxation.

For the right arm to be up in the air, many muscles need to work together. The initiating muscles (or area in the body) for lifting the bow arm will determine the quality of the action: if the lifting originates in the back, the action requires less effort compared to initiating the lifting from the shoulder, the upper arm, or the forearm. Feldenkrais, like Starker, explained that "superfluous efforts shorten the body: in almost every case excess tension in the muscles causes the spine to be shortened."[62] A shortened spine directly affects the arm: its length and range of movement (Experiment 7, p. 42).

Every action involves tension and release. To lift the arm, certain muscles need to be engaged (tensed) while other muscles need to release (let go). Generally, the action of holding the arm high is felt as a lifting which may involve excess tension. However, depending on the perception of this action, and how the muscles perform it, the overall sensation can also be perceived as "letting go" or "dropping." A slight difference in the perception of action gives very different outcomes. The mindset of using effort to lift the arm prevents the nervous system from releasing tension. The action of lifting the arm while dropping into the body, allows more muscles to relax and creates more fluidity between joints. This shows that perception is influential in muscle usage (Experiment 8, p. 43).

In terms of musical expression, the action of the arm determines smoothness (legato), which takes us back to Starker's idea of preparation. To anticipate the bow change means to prepare physically and mentally. The physical preparation includes sensing the difference between pulling and pushing muscles (Experiment 11, p. 46). The pulling muscles are usually engaged in down bows, while the pushing muscles in up bows.

In order to obtain smooth bow changes, the transition needs to be very gradual. To keep the volume and tone quality unchanged, more pronation of the arm before arriving at the tip is necessary. The combined engagement of the pushing muscles together with the pulling muscles around the middle of the bow will make the change smoother. The smoothness of bow changes can be helped with support from the pelvis and the legs by adding more weight to either side. When a motion is initiated further away from the point of contact — that is in the strong core

[62] Feldenkrais, *Awareness Through Movement*, 96.

around the pelvis and low back — the likelihood of getting a smooth movement increases. The timing of pulling and pushing during bow changes, also helps keep the hand soft so that there is no jolt when changing the bow.

Because of the proximity of the hand and wrist to the bow, many cellists use the wrist to help during bow changes. In fact, while holding the bow, the wrist has to be stable enough for the weight to transfer directly into the bow; it cannot move arbitrarily. In general, the wrist will feel more flexible when using the lower part of the bow, and firmer when using the upper part of the bow. In one of his master classes at Portland State University, in 2006, Starker pointed out that the wrist does not move on its own; its motions respond to what is happening in the entire arm (Experiment 12, p. 47; video example 3).[63] The arm is responsible for determining the motion, the wrist follows.[64] The wrist very often involuntarily tenses up because of the fear of dropping the bow, but this excessive localization of power will result in robotic actions of the arm. In contrast, many cellists may also experience a too-loose wrist, resulting in fuzzy sound.

Fingers that grip are one of the biggest obstacles to efficient use of bow-arm weight. If the fingers grasp the bow too hard — a common problem when players try to achieve security and control — the whole hand becomes rigid, and it moves as a single (undifferentiated) unit creating a compressed sound. Like the wrist, the fingers respond to the rotation of the arm. For Starker, the thumb is a particular problem. He mentions that when holding the bow, the thumb "is always the cause of not having the power [of the arm] transferred into the contact point [on the string]."[65] Each finger has a different function with respect to the bow use: the thumb and

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[63] Cellokratzer, "Janos Starker and his OMSP."
[64] Tim Finholt, "Janos Starker Master Class Report," *International Cello Society*, accessed March 17, 2022, http://www.cello.org/Newsletter/Articles/starkmc.htm.
[65] Hamilton Cheifetz, "Starker Teaching Fauré Elegy," *YouTube*, December 26, 2019, https://youtu.be/p2adakpASRU.

second finger are used to pull down the bow, while thumb and first finger are used for pushing during up bows.[66] Starker, in another master class, pointed out that if "the thumb is too stiff, [then] most of the actions are coming from the hand, but not the arm."[67] This blockage of the thumb leads to compensation by other fingers as the bow moves to different positions.[68] Starker also emphasized that the thumb should be kept loose and softly bent so that while pronating the arm, the thumb can flexibly get to different position in relation to the rest of the fingers in order to provide support. Smaller muscles, like the muscles of the fingers, are used to provide accuracy and specificity to an action of the arm. Fingers in this case, help to balance the bow, fine-tune the direction of the bow, and create special articulations.

Supplementary Experiments

When doing these experiments, always return to the neutral starting position between each movement.

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[66] Starker, "OMSP," 280.
[67] Hamilton Cheifetz, "Janos Starker Teaching Popper Hungarian Rhapsody," *YouTube*, May 2, 2020, https://youtu.be/ap8F9CSwhwA.
[68] Ibid.

Experiment 7: Comparing the length of the arm

Figure 19: Object at arm's length.

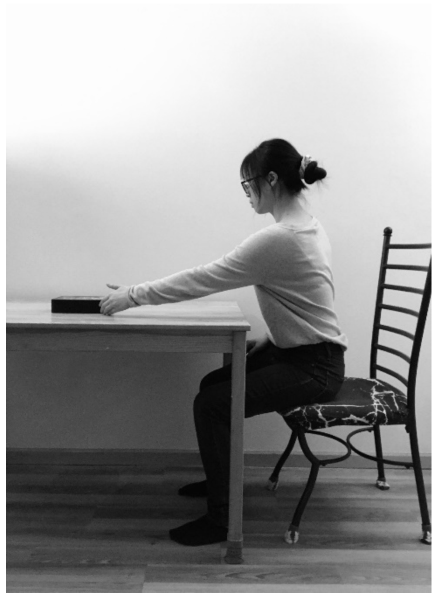

Figure 20: Pelvis to left and reach.

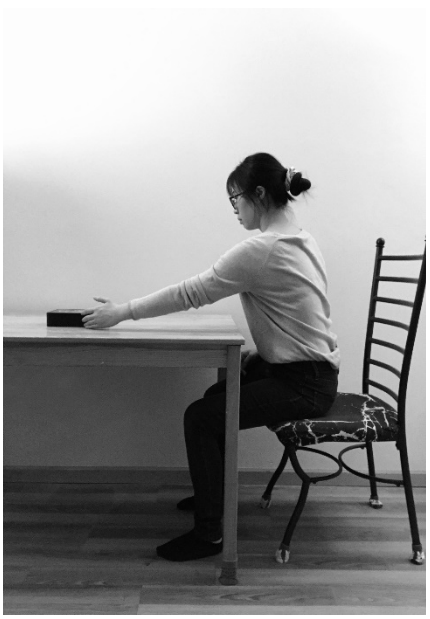

Figure 21: Reach with left knee forward.

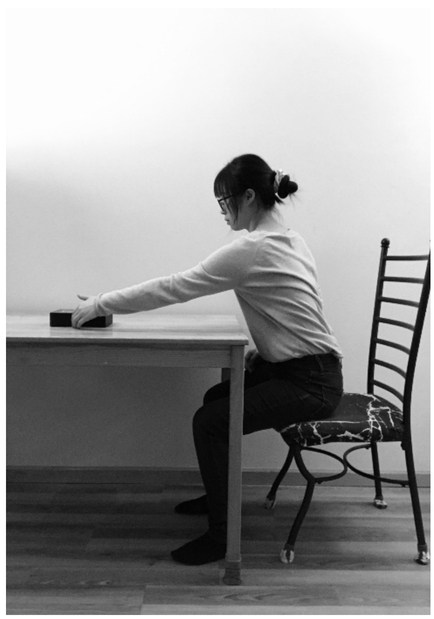

Figure 22: Reach with the back.

1. Sit on the forward edge of a firm chair and place your feet flat on the floor about shoulder-width apart. Place an object on a dining table in front of you at arm's length.

2. Raise the left arm and reach for the object. Lift the right shoulder and reach for the object with the arm. (Fig. 19)

3. Tilt the pelvis to the left and reach for the object again. (Fig. 20)

4. Put weight on the right heel and try to move the left knee forward (pelvis at 2 o'clock), then reach for the object. (Fig. 21)

5. Draw a backward circle and reach for the object with the back as part of the circular motion. (Fig. 22)

Experiment 8: Lifting vs. not lifting

Figure 23: One arm at shoulder height.

Figure 24: Arm raised with chair support.

1. Place a chair with a high back in front of your sitting chair.

2. Lift one arm in the air and hold it at shoulder height. (Fig. 23)

3. Lift the arm and place it on a chair with high back. (Fig. 24)

4. Do not allow the elbow to collapse and remove the chair. Sense the tension needed to keep the arm in the air.

Experiment 9: Pronation of the arm

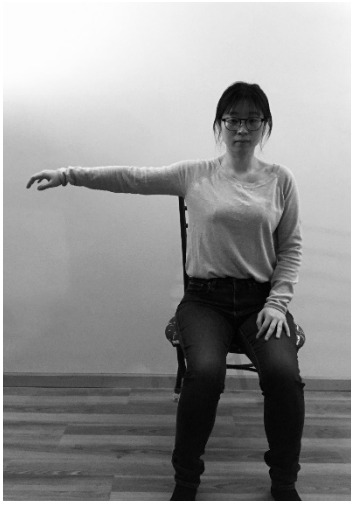

Figure 25: Hold arm sideways at shoulder height.

Figure 26: Rotate with elbow.

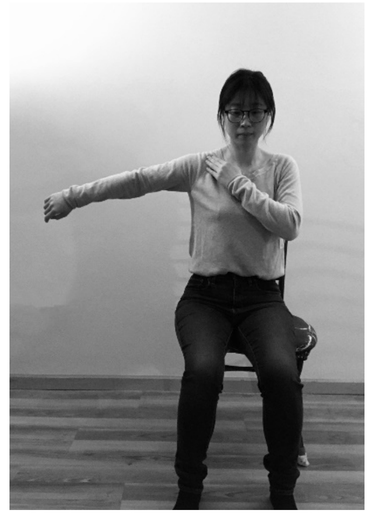

Figure 27: Rotate with shoulder.

1. Sit or stand with your feet flat on the floor about shoulder-width apart.
2. Lift the right arm sideways at shoulder height, with the palm facing the floor. (Fig. 25)
3. Gently touch the elbow of the right arm with your left hand and rotate the right forearm downward. Return to the starting position. (Fig. 26)
4. Gently touch the right shoulder and rotate the whole right arm until the palm faces backward. Feel the rotation in the shoulder joint. Refrain from initiating the rotation from the elbow. (Fig. 27)

Experiment 10: Position of the elbow

Figure 28: Lift right arm.

Figure 29: Lower the forearm.

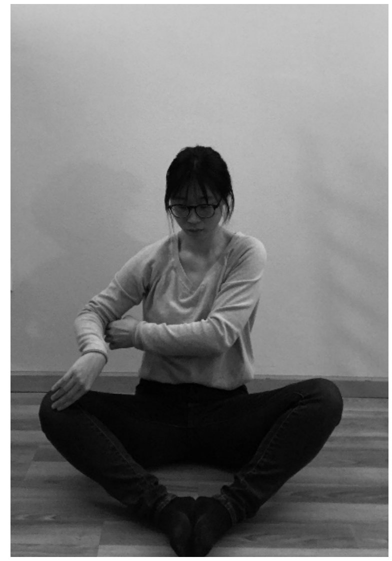

Figure 30: Lower and raise elbow.

1. Sit on the floor with your legs crossed or the soles facing each other.
2. Lift the right arm in front of you at shoulder height and rotate the arm until the palm faces to the right. (Fig. 28)
3. Without dropping the elbow, slowly lower the forearm until the index finger touches the knee. (Fig. 29)
4. Lean on the index finger and let the arm muscles relax.
5. Support the elbow with the left hand, and gradually lower and raise the elbow. (Fig. 30)

Experiment 11: Identifying the pull and push muscles

Figure 31: Pulling.

Figure 32: Pushing.

1. Sit in front of a stable object (such as a dining table, piano, or the knob of a closed door).
2. Softly hold onto the object and try to pull it toward you. Notice what parts of you are engaged in the pulling. (Fig. 31)
3. Now do the opposite: push with the hand against the stable object and notice how different it feels to push an object. (Fig. 32)

Experiment 12: Reflexes of the wrist (video example 3)[69]

Figure 33: Circular movement from elbow.

1. Lift the right arm and keep everything loose.
2. Drop the elbow as if holding the bow.
3. Initiate a circular movement from the elbow and observe the response in the wrist. (Fig. 33)
4. Continue drawing circles from the elbow and slowly make a **soft** fist, observe the wrist.
5. Continue drawing circles from the elbow and slowly make a **hard** fist, observe the wrist.
6. Initiate a circular movement from the shoulder (back), and observe the wrist movements
7. Repeat step 3 and 4 with circles drawn from shoulder.

Remarks: Notice the difference made to the direction of the bow path (applicable to fast notes) between the reflexes of the wrist initiated from elbow (forearm) and the shoulder (upper arm).

[69] Cellokratzer, "Janos Starker and his OMSP."

Experiment 13: Coordination of the eyes in relation to the fluidity of movement (extracted from *ATM* Lesson 10: The Movement of the Eyes Organizes the Movement of the Body)[70]

Figure 34: Position of the legs and hands.

Figure 35: Left hand and head to the right.

Figure 36: Bent left elbow and head to the right.

Figure 37: Bent left elbow to the right, head to the left.

[70] Feldenkrais, *Awareness Through Movement*, 146.

1. Side sit on the floor: Bend the left leg backward to the left; and draw the right foot toward the body (right foot sole touched the thigh near the left knee).
2. Lean the palm of the right hand on the floor and lift the left hand forward. (Fig. 34)
3. Keep the eyes on the thumb of the left hand and turn the shoulders, head, and eyes together to the right with the left hand leading. (Fig. 35)
4. Bend the left elbow and turn to the right. (Fig. 36)
5. Turn to the right with the head, but eyes towards left.
6. Turn the trunk to the right but the head and the eyes to the left. (Fig. 37)
7. Turn to the right with head to the left, but eyes towards the right.

Remarks: Also experiment different directions of the shoulder with the head and the eyes.

Variation 1:

1. Sit with cello and place the bow on D/G string.
2. Keep your head (nose) facing forward and pull the bow.
3. Look at the right hand, follow it with the head and the eyes when pulling the bow.
4. Move the head in the same direction of the bow, but eyes in the opposite direction.
5. Move the head and eyes in opposite direction of the movement of the bow.
6. Move the head in opposite direction to the bow, but eyes moving with the bow.

My Experience

String players are often asked to play a big sound. However, very often both the quality of the sound and the sense of ease suffer. Frequently when reaching the tip of the bow, I found myself holding up my shoulder and tensing up my hand to exert more force onto the bow and the string to prevent the sound from decreasing. Holding up the shoulder unconsciously was the cause of my long-time misperception that my arm was too short to reach the tip of the bow. Raising my shoulder also affected the tone quality because the bow was not “straight” (perpendicular to the strings). With better organization of my arm and my entire body, I realized that my arm was not as short as I imagined.

Using a circular motion to bring the arm to an initial configuration of holding a bow is an effective way of releasing tension in the upper arm. It also prepares the arm to sink into the string. However, the gesture of the circular motion is not what is important: learning to relax the muscles is. In my early attempts to make a circular motion, I found that if I intentionally tensed the muscles, I could then recognize relaxation more easily when comparing the two experiences.

It is also helpful to recognize the difference between controlled circular motion and natural momentum. This momentum, created by circular motion, is important to produce a refined pulling sound. The rebound energy also helps prepare for the up-bow gesture. When the arm is well organized to function smoothly in the creation of a good sound, effort is not needed. Smooth bow changes rely on the clarity between the actions of pulling and pushing, and the ability to anticipate the action of the new bow while still maintaining the clear action of the old bow. A close observation of the elbow area will reveal that a smooth (legato) outcome occurs when the elbow is creating an oval, or figure-8 shape during the transition from one direction to the next.

The pelvis and feet are very important for igniting and transferring body weight and energy to the areas of the body that are in charge of creating the desired sound. In my playing, I find that to use my body weight, I tend to incline slightly more toward the toes to achieve more support. This makes my feet feel more powerful, while at the same time allowing my pelvis to be free. This posture gives me a sense of security and readiness to move, simultaneously. A flexible, well-differentiated pelvis allows the rest of the body to move freely with minimal effort. A flexible pelvis, supported by well-organized legs and feet, can move freely in all directions enabling me to produce a richer palette of sounds and expressions.

The efficient use of the arm largely depends on a fluid and well-organized body, and I found that the fluidity and balance of my body can also be improved by examining the relationship between the eyes, head, and pelvis. Eyes are the guide to many of our movements. In most cases, the eyes and the head move together. According to Feldenkrais, the head "explores and finds the things [one] wants to do outside of yourself, [and] the pelvis carries [the] head and provides the power to do it.[71] When trying to tilt forward and lean more on my toes for more power, the head has to move along. When the connection between the head and pelvis is properly organized, it gives a greater sense of balance, security, and accuracy. This sense of security also allows a greater range of movement, opening more possibilities for performing an action.

Our eyes are responsible for looking at the score most of the time when playing music. This may limit the freedom of the movement of the head depending on the position of the music stand. While the body and pelvis can move independently without the need to move with the head, the fixation of the neck and the head will nonetheless set a boundary to the range of body movements. It may also cause a lost in balance and interfere with the ability to flexibly move our body. This is why learning to differentiate the eyes from the head becomes essential. Once our eyes can move independently from the head, our body can move in a wider range without losing track of the score. (Experiment 13, p. 48) This liberty in the body will promote a more organic playing experience. Cellists can explore these possibilities by moving the music stand to

[71] Feldenkrais, *Master Moves*, 90.

different positions. By doing this, the alignment of the body will change correspondingly. With the support of the feet, this change in body position will allow the arm to recognize more alternatives that cannot be experienced in a front-facing sitting posture.

3.3 Category III: The Left Arm-Hand-Fingers

When playing the cello, it may seem as if most of the work in the left hand is done by the fingers, because the fingers are responsible for changing the notes. In reality much of the work in the fingers is powered from the back and guided by the arm. Moshe Feldenkrais explained that "in correct action, the work done is distributed so that the big muscles do a bigger share of the work and the smaller ones do less in proportion to their size."[72] In this sense, the job of the fingers is to direct the force coming from the arm into the string with accuracy, but not to provide power. In order to replace the muscular force of bringing the string down to the fingerboard, the player needs to learn how to direct the arm weight to each changing finger.

Starker in his method discusses three approaches to placing the fingers on the fingerboard: slanted backward, slanted forward, and perpendicular. He suggested that every player should experiment with all three hand positions. All three are important; each has distinct advantages and disadvantages.[73] For example, a slanted backward position (Fig. 38) is particularly useful in fast passages and shifting, however, it does not provide enough power to

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72 Feldenkrais, *Potent Self*, 189.

73 Starker analyzed the strengths and weaknesses of the three approaches: "The perpendicular hold serves well on thicker strings and in the first seven positions (positions counted by half-steps). The large surface contact on the strings gives a feeling of security, and the arm weight is used to more advantage, but when proceeding to higher positions, breaks in the motion and alterations in the sound quality occur… The backward slant answers the shortcomings of the perpendicular hold; continuity all through the fingerboard is facilitated, and intonation is far more exact. The backward slant favors the use of the first and second fingers and their extensions. The forward slant favors the use of the third and fourth fingers and their extensions. The disadvantages occur in the lower positions, where the weight and pressure concentrate on a minute part of the fingertip and thus extreme exactness is required…" Starker, "OMSP," 282.

the third and fourth fingers; the slanted forward position (Fig. 39) is especially helpful for the third and fourth fingers, but it rotates the shoulder to a rather awkward position; the perpendicular position is particularly beneficial to maintain the relationship between intervals when playing double stops. Since every hand position has different uses, the goal is to master all of them and to adapt freely where applicable, rather than applying a single hand shape to all positions.

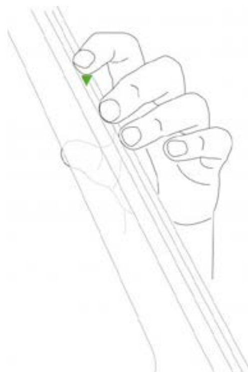

Figure 38: Backward Slant.[74]

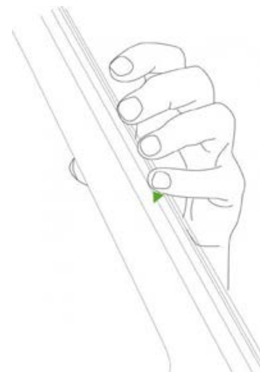

Figure 39: Forward Slant.[75]

With the need to develop dynamic hand shapes to fit different positions on the fingerboard, the arm should be flexible enough to allow alterations for each finger to press in its most efficient manner. The association between the angle of the arm and the fingers for every position along the fingerboard has to be established slowly, but comprehensively before the fingers can move quickly. The fingers, differentiated from the hand, can then facilitate the performance of passages requiring delicacy and accuracy. In *The Elusive Obvious*, Feldenkrais explains that to make even a small movement in the fingers, the brain and the whole body are involved:

[74] https://artist-musikerhalsan.se/en/musician-ergonomics/3-ergonomic-advice-for-sepcific-instruments/3-2-cello-ergonomics.
[75] Ibid.

> In the body, fingers and toes serve differently from elbows and knees, shoulders, and hip joints… Delicate movements need wrists, fingers, ankles, and toes but the entire musculature is involved in bringing the finer extremities to the place where they perform. The shoulders and the hips are necessary where more power is needed, and they are involved in transporting the body to the place where delicate fingers are necessary.[76]

A well-organized arm is needed for power to transfer from the arm and back to the playing fingers and onto the cello; therefore, the positions of both the wrist and the elbow have to be carefully examined. The elbow and the wrist respond to the movement and rotation in the arm and allow the weight to transfer to the fingerboard without the fingers sliding down. Actions like lifting the elbow too high, placing the elbow on the cello, or bending the wrist induce unwanted tension in different muscles, causing a disruption of the energy flow, resulting in the need to produce power from the fingers themselves. This tenses and slows down the fingers and may lead to injury.

Fingers have different functions in different musical passages. Starker, in a master class at the University of Washington in 1999, explained that there are two ways of using the left hand. The first one, the "sostenuto" style, is for playing melodic lines and slower notes, in which the weight is gradually transferred from one playing finger to the next. When the transfer starts, the previous finger begins to release the tension at the same time. The second type, the "keyboard" style calls for the use of gravity where fingers are lifted and dropped. This approach, which is more mechanical, is often used for faster notes, and requires an immediate shift of force only into the finger that is supposed to play.[77] Musical passages that requires fast response of the fingers (the "keyboard" style), are generally tackled using the bony part of the finger. The "sostenuto" style offers more room for exploration of the fleshy part of the finger to produce

[76] Feldenkrais, *Elusive Obvious*, 148.
[77] Paul Diaz, "Shaun Diaz - Janos Starker Master Class at UW 12-8-99," *YouTube*, September 28, 2020, https://youtu.be/U7dv7IJK1Vo.

different tone colors. Depending on the musical context, these two gestures should be freely interchangeable.

Pressing on the string to make a note sound requires a close collaboration between playing finger and thumb. Feldenkrais suggests that dexterity and virtuosity lie in the "ability to oppose the tip of the thumb to the tip of any other finger."[78] Starker also demonstrated a similar idea at the master class mentioned above. He recommended maintaining the hand in a rounded C-shape and pointed out the connections between each finger and the thumb inside the palm.[79] The preservation of the hand shape is useful to prevent a collapse of the thumb, which would undermine the fingers' ability to move quickly. If the cello is resting on the body, Starker also recommends that the weight transferred into the arm be counterbalanced from the back, instead of by the thumb. This way, the thumb does not need to grip the fingerboard for security.

Learning exactly where to place the hand on the fingerboard contributes to more accurate finding of the notes and better intonation. This sense of geography also enables a more precise shifting from one position on the fingerboard to another. Every change of position means a move in the initial finger and a change in hand shape. A sense of geography along the fingerboard is developed through mapping in the nervous system. Improving the sense of geography of the fingerboard requires refining of one's proprioception (the ability to accurately sense and feel oneself and oneself in relation to one's surroundings).

Starker divided the fingerboard into three zones: four-fingers position, three-fingers position, and thumb position. When connecting positions, he recommended using the first finger as a guide.

> The following elements should be observed while connecting positions: Reduce finger tension while traveling on a string. Concentrate on forearm opening and

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[78] Feldenkrais, *Elusive Obvious*, 52.
[79] Diaz, "Janos Starker Master Class at UW."

> closing to sense the distance. Regardless of which finger goes to which finger, the distance should be based on the first finger's old and new positions… Preserve the angle of the hand and fingers to the string. Rotate the forearm outward or inward according to the direction and according to the basic approach in finger contact. Anticipate all new positions by preparing the next position of the arm.[80]

No matter how big or small shift is, this movement should be introduced by the big muscles (from the back and the shoulder), followed by smaller muscles (arm, elbow, and wrist). Shifting involves the opening (or closing) of the upper arm and forearm, which means the muscles of the arm have to be relaxed enough to respond to changes in the back. To allow the shifting motion to be smooth and swift, a circular motion, guided by the elbow, is preferable to a push from the back. If the muscles are tensed or the fingers are initiating the action, it is very likely for the shift to result in a jolt.

Application of *An Organized Method of String Playing for Left Hand*

The *OMSP* for left hand, according to Starker, reveals the "mathematical possibilities" of the cello,[81] namely, the vertical and horizontal connection along the fingerboard. In the book, Starker provides exercises that cover the technical aspects of using the hand — such as finger independence and using the arm for string crossing within one position and shifting — as well as the application of the exercises to specific repertoire.

[80] Starker, "OMSP," 285.
[81] Janos Starker, "Foreword," *An Organized Method of String Playing: Violoncello Exercises for the Left Hand* (New York: Peer International Corporation, 1961).

Position Exercises

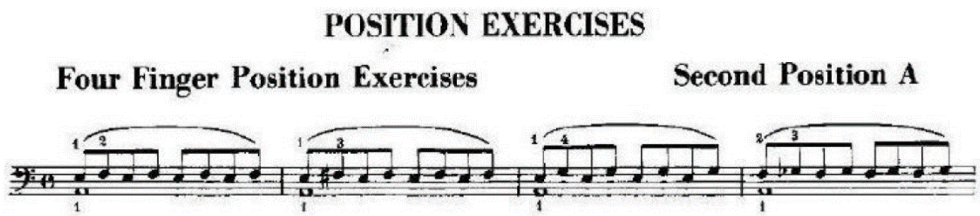

Figure 40: Position Exercise.[82]

Starker introduces position exercises covering four-finger positions, three-finger positions, and thumb positions. The routines usually involve two strings, with a constant move of one finger. It intends to strengthen fingers and to establish the relationship between fingers for intonation purpose. With the use of double-stops, Starker also hoped to reinforce the configuration of the hand shape for different intervals. It is important for the arm to be well organized when working with double stops. The well-structured arm allows the finger to press the strings without pinching them; the fluidity of the arm helps the hand remain flexible so the other fingers can move independently. This flexibility avoids tension in any one finger.

These exercises involve frequent repeated lifting and dropping of a finger. Practicing slowly makes it possible to attend to the alignment of the arm so that each finger can stand in its strongest position. For a fast action that almost resembles a trill, the "keyboard" style of playing is employed. As discussed in section 3.2, a lifting action requires more energy than a dropping action, and almost always induces tension in the muscles. The initial action of a trill should begin with a drop, making the lifting action a rebound.

[82] Starker, *Exercise for Left Hand*, 7.

Although not suggesting their frequent use, Starker does include exercises that practice extended positions. When doing these he recommends rotating the hand so that the thumb moves closer to the third finger, and first finger can stretch back.[83] Instead of going into a stretch with the fingers, it is advised to begin with the rotation with the arm, so that the first and second finger can be naturally spaced out. Starker also suggests that once the finger has done its work, the tension should be released immediately.

Serial Control Exercises

Figure 41: Serial Control Exercise.[84]

The control exercises involve using all the fingers within one position, and across all strings. The position of the arm and elbow should be different for each string since there is visible distance between each string. The further away the string is from the hand, the more the shoulder has to reach. Ultimately, we are looking for a smooth pathway for the arm weight to transfer to the finger and to the string. If the arm can do the work of moving from one string to another, we avoid stretching the fingers.

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[83] Starker, "OMSP," 284.
[84] Starker, *Exercise for Left Hand*, 13.

Connection Exercises

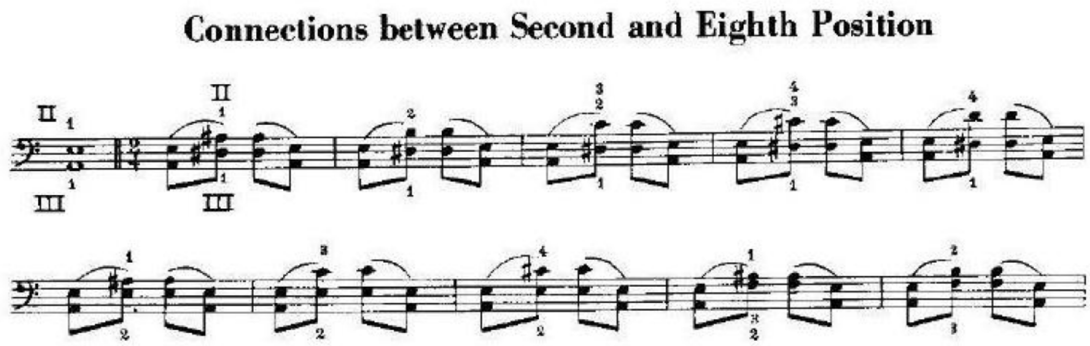

Figure 42: Connection Exercise.[85]

Shifting is one of the most important elements in music making on string instruments: it gives more expression to the music. Starker, in his master classes and his book, introduced anticipated shifts and delayed shifts for different musical styles.[86] To translate this into technique: in an anticipated shift, the "old" finger (the playing finger) is responsible for sliding until the "new" finger (the next finger to play) drops into position. The delayed shift, in contrast, begins the sliding with the "new" finger and generally starts on the next bow.[87] The timing and the speed of the shift creates different musical outcomes.

The movement of the arm during shifting has to be anticipated. The anticipatory gesture is similar to a circular motion in the shoulder, and it can start clockwise or counterclockwise. However, this gesture has to be proportionate to the size of the shift: the bigger the circle, the further the arm travels. If the distance falls short or goes too far, intonation will suffer.

[85] Starker, *Exercise for Left Hand*, 27.
[86] Starker, "OMSP," 286.
[87] Ibid.

My Experience

My biggest discovery when dealing with the left hand involved applying arm weight to bring the fingers down onto the fingerboard instead of squeezing the hand to push the string down. When I squeezed with my hand, tension built up quickly, and I lost the flexibility and agility needed to express my musical intentions. This situation worsened when I was learning a new piece, playing fast passages, or getting nervous. Tension around the wrist, hand, and fingers did not allow my fingers to move smoothly and nimbly. Once I discovered that power could come from the back and travel through the arm to the fingers, my fingers could stand firm without the need to tense the hand muscles. The sound production became more solid, powerful, and refined. Learning to apply weight through the arm has also allowed me to find ways to adjust during playing if I noticed tension building up in my hand.

During the exploratory process of transferring weight onto the fingers, I realized the importance of the height of the elbow. When the elbow was low, the arm felt heavy and was not free to move; instead of the force transferring to the fingers, the weight of the upper arm was sinking toward the low elbow, and the fingers needed to squeeze to stay on the fingerboard. Discovering the optimal height of the arm and position of the elbow clarified the sensation of transferring arm weight to the fingers, allowing them to stand firm but not rigid.

While changing fingers within a position, I realized that the action was not simply about replacing the playing finger with another finger; I needed to learn how to transfer the weight, releasing the old finger while applying weight on the new finger. When I used my arm to allow weight to shift spontaneously from one finger to the next, playing fast passages became much easier and more pleasurable. Eventually, I found that I could imagine each finger as starting around the shoulder blade instead of in the hand, which made sensing the connection between fingers even easier and smoother.

My fourth finger has always felt short; formerly I resolved this problem by straightening and stretching the finger causing it to squeeze into the fingerboard for power. Later I realized that the need to straighten my fourth finger was a result of over-rotating the forearm and hand (backward slant). After exploring different alignments of the arm and connection to the back, I found that the more connected the arm was, the less effort it took for the fourth finger to move and reach. The feeling of transferring arm weight also allowed that finger to become stronger.

The biggest challenge string players encounter when dealing with what Starker called the geography of the fingerboard is the task of developing a strong, accurate spatial orientation in which the fingers can move accurately and become organized in positions along the fingerboard. Very often I found myself looking at the fingerboard for notes, however, visual cues did not help much. I had to learn to refine my kinesthetic sense of where and how to move along the fingerboard. This requires a clear sense of spatial orientation and a training of my proprioceptors to assess precisely where notes are. I have discovered, through practicing Feldenkrais ATM lessons, that I have a much improved ability not only to sense and feel what I'm doing, but also to imagine the fingerboard more accurately, and to associate it with specific arm configurations. Having a clearer sense of the geography of the fingerboard allows my brain to anticipate the actual movement so I can facilitate the shift with greater efficiency. This has resulted in better intonation and better and more accurate connections between positions.

Shifting from one position to the next on the fingerboard requires attention to many details, such as the alignment of the arm, speed of the movement, heaviness, or lightness of the arm at different parts of the shift, etc. I discovered that when moving between positions, circular movements, initiated from the back and directed into the arm, resulted in a more favorable outcome than moving the arm in a straight line. This circular motion created a momentum in the arm that allowed it to move with less effort. The momentum also minimized the kind of robotic or abrupt gestures produced by a quick, straight motion of the forearm.

Understanding that shifting means connecting *positions* rather than *notes*, helped me expand my repertoire of preparation gestures leading to the shift. This facilitated more smoothness particularly in fast passages. Similar to the preparatory breath prior to a musical expression, the style of shifts (anticipated or delayed) one chooses should reflect the character of the music that is being played.

Conclusion

This project was inspired by my study with Professor Uri Vardi, who focuses both on Janos Starker's *The Organized Method of String Playing* and the principles of the Feldenkrais Method. Both methods teach us that a knowledge of how the body functions provides a deeper experience of the concepts and the logic behind cello technique.

The *OMSP* is a wonderful resource; it covers fundamental concepts of efficient playing, addresses basic bodily functioning, and resolves queries on technical issues. Understanding *OMSP* intellectually was not difficult for me but putting it into practice was more complicated because I had never used my body this way before. The Feldenkrais Method gave me the tools to learn and benefit from the *OMSP* in a deeper way.

In this paper, I have described how combining the two methods helped change my old habits and improved my level of playing. The addition of the principles of the Feldenkrais Method to the *OMSP* provided inspiration to my cello playing by giving me many more options to perform an action. When there are more options, and when the intention of the action is clear, musical intentions can be expressed more precisely.

While I have described the many ways that Feldenkrais has helped me become a better cellist, the journey is not completed, and there is still a lot more to learn and explore.

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