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RETHINKING VIOLIN PEDAGOGY: A HANDBOOK FOR TEACHING VIOLIN FROM A MOVEMENT-BASED PERSPECTIVE

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RETHINKING VIOLIN PEDAGOGY: A HANDBOOK FOR TEACHING VIOLIN FROM A MOVEMENT-BASED PERSPECTIVE

A DOCUMENT APPROVED FOR THE
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To my parents, with love and gratitude

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Abstract

Violinists regularly experience musculoskeletal pain and tension while playing their instrument. Many view this as an occupational hazard, a byproduct of long days of playing. However, preventative and rehabilitative care like stretching, massages, and painkillers only go so far when the root of the problem lies in the violinist's misuse of their body while playing. It is essential that violin teachers not only provide their students with biomechanically sound foundations of technique, but to prioritize retraining movement and motor skills to fix longstanding problems with playing. However, many violinists begin their teaching careers without a formal understanding of biomechanically healthy technique or effective teaching strategies.

This document proposes using the framework of Qualitative Movement Diagnosis (QMD) to empower violinists to better teach and evaluate technique from a kinesiological, or movement-based perspective. QMD is a tool developed by academic researchers for diagnosing and correcting movement errors. As a multidisciplinary approach drawing from kinesiology, exercise pedagogy, psychology, and physiology, QMD is uniquely adaptable to movement-based disciplines and therefore can easily extend to violin teaching. This study incorporates existing music-pedagogy research and important violin treatises within the framework of QMD in the form of an introductory handbook comprising theoretical concepts, suggestions, and techniques drawn from kinesiology, sports, and dance-imagery research to help instructors assess and supplement their own gaps in knowledge; prioritize biomechanically healthy movement; better observe, evaluate, and diagnose technique issues; and provide tailored remediation and other interventions.

Keywords: violin, teaching, pedagogy, injury, movement, remediation, kinesiology, dance imagery, Qualitative Movement Diagnosis, Franklin Method

Chapter One: Introduction

Part I: The Need for a Violin Pedagogy that Incorporates Biomechanical Understanding and Principles of Effective Instruction

88 percent of violinists report suffering an overuse injury during their career.[1] Over the past decade, I myself have struggled with musculoskeletal injuries caused by various underlying body misalignments and muscle imbalances. While I have been fortunate to work with supportive violin teachers who taught me how to practice efficiently and physical therapists, naturopaths, and bodyworkers who treated my symptoms, the palliative effects were temporary. I would return to my practice room and manage the pain and tension, which wanted to creep back in, long enough to put in an hour or two of work, if I was lucky. Playing the violin became synonymous with tightness and pain—until, that is, I prioritized eliminating tension in my violin technique, addressing body misalignments, and incorporating anatomically correct movement patterns.

Many musicians view soreness, fatigue, and pain as occupational hazards, a byproduct of long days of rehearsals or practice sessions. They regularly stretch, get massages, and use the occasional painkiller or muscle salve to counteract the symptoms they have come to expect. However, such preventative and rehabilitative care only goes so far when the root of the problem lies in the violinist's misuse of their body while playing. Faulty technique and poor posture are two of the top five risk factors identified by violinists suffering from performance-related musculoskeletal injuries (PRMI) and by performing arts medicine professionals.[2] Eric Franklin, a

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[1] Bronwen J. Ackermann, and Roger D. Adams, "Perceptions of Causes of Performance-related Injuries by Music Health Experts and Injured Violinists," *Perceptual and Motor Skills* 99, no. 2 (2004): 669, https://doi.org/10.2466/pms.99.2.669-678.

[2] Ibid., 673.

dance pedagogue and somatic educator, explains that when you move with excess tension or have misalignments, your brain integrates those aspects into its neural representation of the movement.[3] Practicing compromised movement patterns over and over cements them in the brain and body. It is difficult to notice bad alignment or inefficient movement patterns if they become habitual, which often leads to overuse injuries.[4] Voice pedagogue Lynn Helding extends this concept to music performance, remarking that "just because it feels good does not mean it produces a desirable sound or a healthy use of the body. Motor learners who struggle to undo entrenched and harmful muscular patterns are up against this paradox and generally cannot guide themselves out of a movement rut but must seek objective help from a teacher."[5]

The professional violin teacher can play an essential role in addressing and preventing musculoskeletal issues in the violin studio. Indiana University professor Brenda Brenner states that "understanding how to build string technique correctly from the beginning through advanced levels, establishing mastery at each stage so that the students can effectively execute the technical issues as well as perform musically and contribute creatively to the process are integral to fine string teaching."[6] However, violin teachers lack systematic pedagogical preparation.

Additional high-risk factors include long hours of practice, sudden increases in playing time, and insufficient rest breaks.

[3] Eric Franklin, *Dynamic Alignment Through Imagery*, 2nd ed (Champaign, IL: Human Kinetics, 2012), 38.

[4] Ibid., 43–44.

[5] Lynn Helding, *The Musician's Mind: Teaching, Learning, and Performance in the Age of Brain Science* (Lanham, MD: Rowman & Littlefield Publishers, 2020), 129, ProQuest Ebook Central.

[6] Brenda Brenner, "Reflecting on the Rationales for String Study in Schools," *Philosophy of Music Education* 18, no. 1 (Spring 2010): 47, https://www.jstor.org/stable/10.2979/pme.2010.18.1.45.

Collegiate string education students undertake regimented, onerous course loads comprising teaching practicums, instrument methods classes, educational philosophy classes, and pedagogical methodologies and practices. In contrast, university institutions rarely offer comprehensive pedagogy programs for violinists on a performance or private teaching track. Students usually work in apprenticeship-style settings with a primary instructor who teaches specific playing techniques often based on their own studies or preferences that lack a sound biomechanical foundation. Pedagogical courses, if offered at all, usually are limited to literature reviews of important treatises.

Many violinists graduate and begin teaching careers without a formal understanding of healthy technique or effective teaching strategies, despite being highly gifted performers. To be fair, many instructors develop their own pedagogical systems through years of teaching experience or are certified through programs like the Suzuki Method or the Royal Conservatory of Music Certificate Program. They foster compassionate teaching environments, develop creative teaching devices and instructional images tailored to their students, and take supplementary courses in Body Mapping or other movement-educational methods. However, to attain this level of expertise, violinists often invest extensive amounts of their own time and money in professional development outside their collegiate studies.

Even some highly experienced violin teachers who prioritize training muscle activity and healthy posture from the beginning struggle to help some students. One such pedagogue is Susan Kempter, who admits,

> Some students, no matter how much they have been shown, nagged, or video taped, continue to play with less than desirable movements. These students, while progressing, never go beyond "OK." I have never been able to introduce them to the virtuoso

> literature. Instead, we continually struggle with shifting, vibrato, string crossings and the mechanics of playing in the student repertoire.[7]

This struggle to help students brings to light an important concern with traditional violin teaching, which the great twentieth-century concert violinist Yehudi Menuhin called a "hit-or-miss activity."[8] Alexander Technique teachers Judith Kleinman and Peter Buckoke explain that "many great players 'know' how to play brilliantly but cannot easily put into words how they do it."[9] For instance, Yehudi Menuhin, in his autobiography, *Unfinished Journey*, describes a childhood encounter with Mishel Piastro, who would become the concertmaster of the New York Philharmonic. Menuhin admired Piastro's *staccato* bow stroke and asked after a concert how he executed it. Piastro picked up his violin and quickly played a couple measures of flawless *staccat*o. "I do this," he said, "and this." Baffled, Menuhin writes that Piastro "did not explain for the simple reason that he could not. He could not unpick the mechanics of muscle or motion that produced his staccato—or my own, for that matter."[10]

Cognitive psychologists describe this phenomenon as the "curse of expertise." Researchers at Yale University found that individuals with formal expertise in a topic often overestimate their ability to explain related concepts to learners. This **illusion of explanatory depth** (IOED) occurs because experts do not realize they are forgetting small bits of

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[7] Susan Kempter, *How Muscles Learn: Teaching the Violin with the Body in Mind* (Van Nuys, CA: Alfred Music, 2003), 10, Kindle.

[8] Yehudi Menuhin, *Unfinished Journey: Twenty Years Later* (New York: Fromm International Publishing Corporation, 1997), 25.

[9] Judith Kleinman and Peter Buckoke, *The Alexander Technique for Musicians* (London: Bloomsbury, 2013), 193.

[10] Menuhin, *Unfinished Journey*, 260.

knowledge.[11] IOED especially affects experts' memories of their own experiences as beginners. Stanford University professor Pamela J. Hinds conducted a study where expert, intermediate, and novice LEGO users built toys and then guessed how long it would take a beginner to complete the task. Hinds observed that experts consistently underestimated how long it took novices to construct toys. When prompted, the experts struggled to remember their own early experiments with LEGOs, which suggests that they based their predictions on their current skill level and recent experiences.[12] It is no wonder Piastro could not explain how he played *staccato*—the knowledge was buried deep in his muscle memory.

The curse of expertise can affect violinists at every level of training. Vanessa Mio, a music education professor at the University of Windsor, reports that collegiate and conservatory violin teachers in a 2019 study unanimously agreed that first-year postsecondary students often require remedial instruction because of ineffective communication and poor-quality instruction early on. She cautions that teachers' choice of language and instruction style might mislead students and cause them to misinterpret instructions, miss important concepts, and even suffer tension and physical discomfort.[13] An extreme example of this danger again concerns Menuhin, who struggled with musculoskeletal tension and lost the intuitive ease with which he played the

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[11] Matthew Fisher and Frank C. Keil, "The Curse of Expertise: When More Knowledge Leads to Miscalibrated Explanatory Insight," *Cognitive Science* 40, no. 5 (Sept. 2015): 14–15, https://cogdevlab.yale.edu/sites/default/files/files/Fisher2015.pdf.
All bold-faced terms can be referenced in the Glossary.

[12] Pamela J. Hinds, "The Curse of Expertise: The Effects of Expertise and Debiasing Methods on Predictions of Novice Performance," *Journal of Experimental Psychology: Applied* 5, no. 2 (1999): 217, https://pdfs.semanticscholar.org/376d/8193541fe89acb09cb13a8d7ae035a001dec.pdf.

[13] Vanessa Andrea Mio, "The Need for Remedial Pedagogy in Undergraduate Violin Instruction: A Case Study of Postsecondary Instructors' Perceptions," *National Association for Music Education* 37, no. 3: 39 (2019), https://doi.org/10.1177%2F8755123319826243.

violin at the height of his career. Menuhin partially attributed his injuries to underlying technique problems, remarking that neither of his primary teachers as a child instilled in him a solid understanding of the mechanics of violin-playing.[14] He spent years searching for a solution and, hypothesizing that his problems were movement-based, became an enthusiastic student of noted yoga guru B.K.S. Iyengar in India.[15]

To help their students play with freedom, ease, and healthy technique, teachers must develop a keen understanding of anatomy and biomechanics and be able to diagnose instances of excess tension and inefficient movement in their students' playing. A skilled teacher should explicitly communicate instructions as to how to move with greater efficiency and kinesthetic awareness. Helding asserts that the "successful transference of any physical technique from teacher to student, be it in the realm of athletics, dance, or music, ultimately hinges on the ability to impart a motor skill from teacher to student."[16] *How* violin teachers communicate information about technique and movement matters as much as *what* they teach.

To be sure, violinists experiencing pain should first consult a medical expert in order to diagnose symptoms and determine a plan for rehabilitating PRMD if needed. Many playing-related injuries are considered to be movement-related rather than medical-related (meaning they do not require surgery), and working with a skilled performing-arts medical practitioner,

[14] Menuhin, *Unfinished Journey*, 260–261.

[15] To learn more about Menuhin and Iyengar's work together, see Hannah Murray, "Using Iyengar Yoga to Enhance Violin Playing" (DMA diss., University of Oklahoma, 2017), SHAREOK.

[16] Helding, 98.

bodyworker, movement educator, and/or physical therapist can resolve many issues.[17] Fortunately, there are many movement-education modalities and somatic disciplines available to musicians today: Alexander Technique, Body Mapping, Feldenkrais, the Franklin Method, Timani courses, Pilates, and yoga, among others. But, alarmingly, a 2012 survey of Australian orchestral musicians found that half of the participants who had previously experienced an injury as a professional continued to play with an unresolved injury.[18] This situation may occur for several reasons, including difficulties finding an effective treatment or modality to address highly individualized musculoskeletal issues, lack of financial resources or access to quality treatment, emotional and mental trauma related to injury, or failing to account for unhealthy movement patterns and areas of tension specific to playing with an overuse injury.

Violin instructors provide fundamental knowledge of posture and technique, ergonomic recommendations, practice strategies, and mental skills for performance. Incorrect, incomplete, or misapplied information in any of these areas may eventually lead to students developing musculoskeletal injuries during school or later in their careers. Menuhin came to understand that the core of all technique, all artistry, is movement. We can empower violinists to more effectively teach and evaluate violin-playing from a kinesiological (movement-based) perspective.

Part II: Incorporating Qualitative Movement Diagnosis into Violin Pedagogy

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17 Heather J. Buchanan and Terrence Hays, "The Influence of Body Mapping on Student Musicians' Performance Experiences," *International Journal of Education & the Arts* 15, no. 7 (Sept. 3, 2014): 4, http://www.ijea.org/v15n7/.

18 Bronwen J. Ackermann, Tim Driscoll, and Dianna T. Kenny, "Musculoskeletal Pain and Injury in Professional Orchestral Musicians in Australia," *Medical Problems of Performing Artists* 27, no. 4 (Dec. 2012): 183, https://doi.org/10.21091/mppa.2012.4034.

This document is structured as an introductory handbook for research-based methods of teaching and evaluating healthy movement, methods that can be easily used by violin teachers or readily integrated into collegiate pedagogical courses to prepare students for teaching careers. Using the framework of **Qualitative Movement Diagnosis (QMD)**, a kinesiological tool for diagnosing and fixing movement errors in athletics, this working manual lays out a theoretical framework for movement-based violin pedagogy using pedagogical concepts, suggestions, and techniques drawn from kinesiology, sports, and dance research that I have adapted for use in the applied violin studio. Violinists can use the information presented in this document to assess and supplement their own gaps in knowledge; prioritize biomechanically healthy movement; better observe, evaluate, and diagnose technique issues; and provide tailored remediation and other interventions. The Glossary and the Table of Contents can be used to quickly reference specific topics and bold-faced terms as needed.

QMD is a systematic process for observing and judging "the quality of human movement for the purpose of providing the most appropriate intervention to improve performance."[19] The current and most widely accepted model of QMD, proposed by kinesiologists Duane V. Knudson and Craig Morrison, consists of four stages—preparation, observation, diagnostic evaluation, and intervention—depicted in figure 1. In this framework, a violin teacher applies their knowledge of violin-playing, student characteristics, and effective instructional strategies—gathered during the preparation stage—to observe the student's playing, evaluate and diagnose errors requiring correction, and determine the most effective intervention to help the student improve. Knudson and Morrison's model of QMD incorporates principles from kinesiology, physiology, sports psychology, and current exercise pedagogy research into each stage. They believe good

[19] Duane V. Knudson, *Qualitative Diagnosis of Human Movement*, 3rd ed. (Leeds: Human Kinetics, 2013), 4.

movement analysis requires an understanding of both biomechanical information and methods of effective instruction, acknowledging that the "kinesthetic sense of skilled athletes may not transfer into QMD ability."[20]

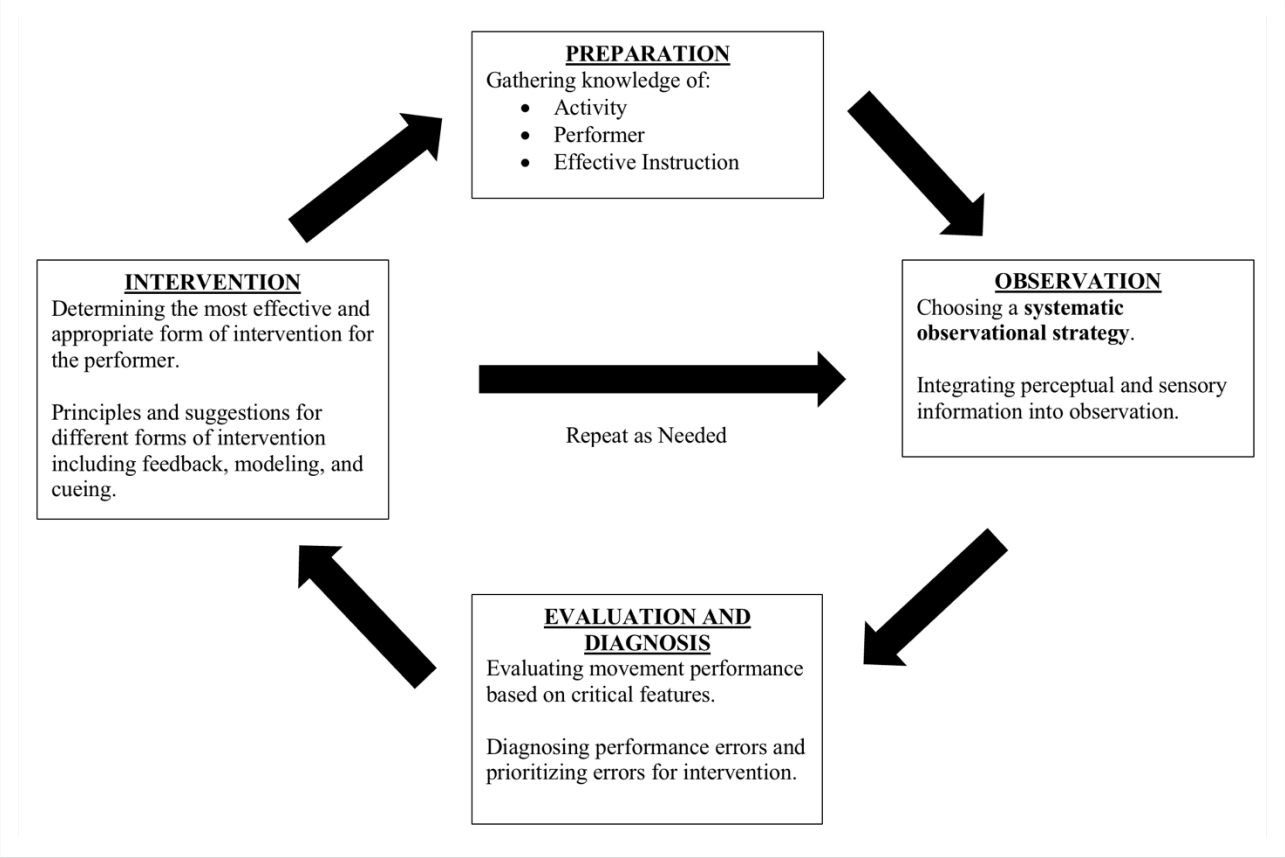

Figure 1. QMD Model. Adapted from Duane V. Knudson, *Qualitative Diagnosis of Human Movement*. 3rd ed. (Leeds: Human Kinetics, 2013), 10.

Why use a kinesiological approach? There are many similarities between music and athletics. Both entail training muscular strength, stamina, and motor control in order to perform advanced motor skills under pressure. Just as a gymnast must repeatedly practice individual skills and full routines on the balance beam in order to successfully execute them in competition,

[20] Ibid., 27–28.

a violinist must practice individual techniques and entire pieces to gain fluidity and endurance for performance. Efficient and safe movement is necessary to avoid fatigue and injury and make performing easier.

Musicians and athletes may devote years of study to their craft in pursuit of mastery and spend their formative years working with a primary coach or teacher, who uses strategies like demonstrations and repetitions to teach and hone technique. While twenty-first century violinists are encouraged to practice and prepare for a performance like athletes, we do not train our violin teachers to evaluate and improve movement performance systematically like sports instructors. Musicians have adopted cognitive strategies like imagery, visualizations, relaxation techniques, and goal setting from sports psychology research to address performance anxiety and achieve peak performance.[21] In contrast, athletic coaches actively monitor physical fitness, practice routines and conditions, and efficacy of movement, whereas music teachers are generally less aware of postural and practice conditions that negatively affect the body.[22]

It is important to recognize that helping students express themselves musically and develop artistically should always be priorities in violin lessons. However, music teachers are sometimes required to act simultaneously as a "comforter, arbiter, psychologist, physical therapist, personal trainer, nutritionist, drill sergeant, guru, and technical advisor."[23] We can better support our students by learning more about different aspects of teaching, including

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[21] Leslie Sisterhen McAllister, *The Balanced Musician* (Lanham: The Scarecrow Press, 2013), 21–22.

[22] Ibid., 24.

[23] Jonathan Thomson, "Training for Performance: Lessons from Sports Psychology Applied to Musical Training" (DMA diss., University of California, Los Angeles, 2014): 9-10, ProQuest Dissertations & Theses Global.

methods of effective instruction, anatomy and biomechanics, and analyzing and diagnosing movement-based technical issues from kinesiologists and teachers of movement-based disciplines like athletics, dance, and somatic methods.

Roger Bartlett, former chair of the British Olympic Association's Performance Analysis Steering Group, calls QMD the "most convincing approach to a structured qualitative analysis of sports movements."[24] As a multidisciplinary approach drawing from biomechanics, pedagogy, motor development, motor learning, psychology, and physiology, QMD is uniquely adaptable to many movement-based disciplines like athletics and dance.[25] It therefore easily extends to violin-teaching, as instructors often give qualitative feedback in lessons after a student plays, such as discussing tone quality or execution of fast passages, to help improve performance and technique. However, qualitative analysis in coaching, no matter the discipline, faces issues with reliability and objectivity. A systematic approach is essential to objective and scientific analysis.[26]

The framework and principles of QMD can benefit violin teachers immensely. First, QMD establishes a theoretical groundwork and vocabulary for teaching movement-based disciplines. Instructors and analysts in sports disciplines require extensive knowledge of movement patterns and biomechanics for effective qualitative analysis—knowledge severely

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[24] Roger Bartlett, *Introduction to Sports Biomechanics: Analyzing Human Movement Patterns*, 2nd ed. (Routledge: New York, 2007), 47, http://www.profedf.ufpr.br/rodackibiomecanica_arquivos/Books/Introduction%20to%20Sports%20Biomechanics.pdf.

[25] Knudson, 7–8.

[26] Bartlett, 38–39.

lacking in traditional violin pedagogy.[27] Some violinists may be knowledgeable about technique but not know how to observe and diagnose the cause of an error. Others may be skilled at error identification but not as successful determining highly effective interventions.[28] QMD provides a roadmap, helping violinists gather essential prerequisite knowledge, prepare for observation, confidently evaluate and diagnose causes of errors, and choose the most appropriate feedback for each scenario. Secondly, QMD's principles help improve teachers' analytical skills by encouraging thoughtful consideration of multiple perspectives and factors involved in performance. "Qualitatively analyzing human movement from a single perspective will result in a fragmented and incomplete understanding of movement," Knudson warns.[29] QMD can also help guard against "paralysis by analysis" during lessons by offering new tools and strategies for problem-solving movement-based technique issues.[30] Thirdly, QMD is adaptable, as pedagogical research shows that different styles of instruction successfully work within the QMD model.[31] Violinists can use QMD as an analytical tool when working with students of all ages and abilities.

The handbook that is this dissertation is not intended as a replacement for pedagogical training from the Suzuki Association of the Americas, the Royal Conservatory of Music, Mimi Zweig's StringPedagogy.com, Paul Rolland String Pedagogy, or other training programs. It does not make any recommendations regarding repertoire, technical progressions, or specific

[27] Ibid., 39.

[28] Knudson, 13.

[29] Ibid., 6–7.

[30] Ibid., 11.

[31] Ibid., 29.

instructions for violin technique in the manner of a treatise. Nor does it substitute for extensive training in somatic methods like Alexander Technique and Body Mapping. Familiarizing oneself with movement patterns takes time and careful study with accredited teachers or programs. What this handbook offers is an introduction to the systems and processes for evaluating, diagnosing, and resolving student-specific technical and physiological difficulties.

Chapter Two: A Survey of the Literature on Violinists and the Treatment and Prevention of Injuries

Overview

"With our chins pressing into the chin-holder, our left arm contorted sometimes almost beyond human endurance, our fingers taxed beyond their natural capacity, I do not see how it is physically possible to maintain a loose, relaxed position for very long," observes violin pedagogue Kató Havas.[1] This survey explores how violinists historically have conceptualized and taught movement and their role in injury prevention.

Part I: Movement Trends

From Carl Flesch's *The Art of Violin Playing* (1924) onwards, violin treatises have tackled teaching healthy movement as an essential component of violin technique. Most pedagogues emphasize the importance of developing tension-free playing during violin lessons. Mimi Zweig defines two goals of healthy violin-playing as "playing comfortably with a relaxed and natural physical set-up" and "balancing the left and right hands efficiently.[2] Similarly, Susan Kempter argues that "teaching movements to be fluid, postures to be stress-free and balanced and teaching students and parents what to look for to achieve these ends can be a constructive and fulfilling musical experience for young children and a necessary part of the mechanics of playing for older beginners and adults."[3] However, pedagogues approach violin technique from different perspectives and philosophies of movement. Some draw from motor research (e.g. Paul

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[1] Kató Havas, *A New Approach to Violin Playing* (1961; repr., London: Bosworth & Co. Ltd., 2001), 10.

[2] Mimi Zweig, "Topic 1: Getting Ready to Move," String Pedagogy.com, accessed March 26, 2021, http://www.stringpedagogy.com/members/?submissionGuid=d99cbe35-ac33-4d21-86e7-e02dd79d44b8.

[3] Kempter, 5.

Rolland, Kempter) or somatic methods like Yoga (Yehudi Menuhin) and Alexander Technique (e.g. Simon Fischer, Gwen Thompson-Robinow, Zweig, Rolland, and Kempter). This chapter discusses trends and principles of movement emerging from prominent pedagogical voices dating from the early twentieth century and concludes with a critical examination of how movement and other holistic wellness concepts are taught in contemporary learning environments.

2.1.1. Scientific Approaches to Motor Learning

Research-based approaches to movement and motor learning first appear in Rolland's *The Teaching of Action in String Playing* (1974), which includes an introduction to the scientific principles of motor learning researcher F.A. Hellebrandt. Hellebrandt explains that the body's natural movements are stored in the brain as fundamental patterns.[4] He declares that "no practical system of violin pedagogy has ever been built on knowing the specific muscle actions which contribute to technical proficiency."[5] Hellebrandt praises Rolland as one of the first pedagogues to incorporate natural movement patterns into the preparatory stages of learning technical skills and to prioritize "dynamic postural balance."[6] Similarly, Kempter believes that muscles and movements should be trained to the point of unconscious competence before concentrating on musical aspects of playing, citing research showing that conscious learning

[4] F.A. Hellebrandt, "Control and Regulation of Voluntary Movements," in *The Teaching of Action in String Playing*, by Paul Rolland (Urbana, IL: Illinois String Research Associates, 1974), 17.

[5] Ibid., 14.

[6] Ibid., 12.

takes place within a limited amount of the brain's working memory.[7] By focusing on foundations of posture and functional movement so early, violin playing and teaching become more enjoyable because there will be less need to address tension or injuries, and students will be able to play difficult repertoire with a fluid technique and expressivity. (Kempter takes this to an extreme by devoting the first year or two of lessons to addressing what she calls the "Basic 6" foundational skills of movement: feet placement; good alignment of shoulders, back, pelvis, and legs; a tension-free neck; ergonomic bow hold; soft, curved left hand; and demonstrating quiet, focused attention.)[8]

A key component of violin teaching is **proactive interference**, where the body has to relearn or change an established posture or movement.[9] (This concept is the basis of remedial pedagogy.) "Built in patterns of coordination tend to always supersede contributed manipulations," Hellebrandt cautions, meaning the body reverts to familiar habits.[10] For example, students learning a new bow hold will unconsciously return to the original hold the moment they stop paying attention to their hand.[11] Violin teachers influence how quickly students automize movements and techniques (becoming unconscious motor skills).[12] Kempter pays special attention to principles of motor learning at both the beginning stage of learning

[7] Kempter, 4.

[8] Ibid., 6–8.

[9] Ibid., 77.

[10] Hellebrandt, 17.

[11] Kempter, 77.

[12] Hellebrandt, 14.

movements and when students are required to modify or change previously learned habits. The beginning stages of muscle acquisition can be viewed as a closed loop:

1. An idea creates an impulse in the brain to move.
2. The brain recruits muscles and initiates movement.
3. The movement is evaluated by the student or teacher.
4. The idea is refined and repeated, beginning the cycle again.

During this cycle, students are conscious of their movements and can more readily make changes. Teachers should closely monitor all aspects of movement and help students correct or refine movements as long as it takes for the correct movement to become automatic.[13] Other parts of the body not obviously involved in holding the violin and bow can influence movement and sound quality.[14] Galamian calls this the interdependence of technical elements. Using the example of the bow-hold changing, he states that "one must permit all other parts of the hand and arm to find their corresponding organic adjustment and their new natural balance, one with the other."[15] The brain engages in **ballistic movement**, which Kempter describes as the unconscious recruitment of muscles used to complete a movement. If the performer focuses "too much on 'the music' and leave the multitude of options available to the body producing it to chance," they may engage unnecessary muscles, or the quality of their movements, and therefore their technique, may be negatively affected.[16]

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[13] Kempter, 70-73.

[14] Hellebrandt, 17.

[15] Ivan Galamian, *Principles of Playing & Teaching* (Mineoloa, NY: Dover Publications, Inc., 2013), 2.

[16] Kempter, 72–73.

Teachers can provide clear instructions, which Kempter calls cognitive commands (and which this document explores from the kinesiological perspective, in which they are called **cues**). These cognitive commands convey "the appropriate musical element (rhythm, pitch, meter, etc.), and the kinesthetic element (how to [perform] it in a non-injurious way)."[17] Students can also develop their sensory perceptive skills, or body awareness. Postural and positional adjustments based on sensory feedback "evoke patterned responses affecting the body as a whole, such as the stability of the stance, the security of the violin hold, the freedom and positioning of the upper extremities, etc."[18] Kempter also reminds teachers to spend the appropriate amount of time in the beginning stages of acquisition and not to push students into repertoire they cannot play with physical ease.[19]

2.1.2. Mind-Body Connections

Fischer describes the mind-body connection in violin playing as the "command-response," where the brain sends a command and the muscles respond. Fluent playing requires that "the mental picture (of the musical intention and the whole act of playing) … be clear; and the hands have to be set up on the instrument so that every muscle is in a state of balance and freedom, and capable of instantaneous response to the mental command."[20] This principle dates back to Galamian's theory of **correlation** in *Principles of Violin Playing and Teaching* (1962), which states that the "key to facility and accuracy and, ultimately, to complete mastery of violin technique is to be found in the relationship of mind to muscles, that is, in the ability to make the

[17] Kempter, 80.

[18] Hellebrandt, 21.

[19] Kempter, 80–81.

[20] Simon Fischer, *The Violin Lesson* (London: Peters Edition Limited, 2013), 105.

sequence of mental command and physical response as quick and precise as possible."[21] Galamian believes muscular strength is not as important as the responsiveness to mental directives. Violinists can improve their correlation through rhythmic variation exercises and left and right-hand coordination exercises (different patterns of slurred and separated notes).[22]

Using imagery is another approach to the mind-body connection. Some violin teachers use images to explain technical concepts and abstract concepts of alignment and movement. For example, Gwen Thompson-Robinow uses the image of a balloon anchored by a stone to describe how the back muscles support the arms in a suspended position while holding the violin.[23] In teaching shifting, Mimi Zweig likens the fingertips to the tip of an iceberg and the arm to the rest of the iceberg moving beneath the "surface" of the fingerboard.[24] Don Weilerstein thinks about movement more conceptually as energy and encourages violinists to imagine the flow of energy moving from the core to the extremities and to help feel the lower back and upper back widening while playing.[25] Table 1 lists several energy images Weilerstein uses to engage the body. While examples of imagery can occasionally be found in pedagogical treatises, they do not teach violinists how to create and use images systematically to improve movement. Chapter Six offers

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[21] Galamian, 2

[22] Ibid., 6.

[23] Gwen Thompson-Robinow, *The Embodied Violinist: Teaching Violin with Passion and Practicality* (Canada: Gwen Thompson-Robinow, 2017), 30.

[24] Mimi Zweig, "Shifting Link," StringPedagogy.com, accessed March 4, 2021, http://www.stringpedagogy.com/members/?submissionGuid=91efd079-45ea-4750-9993-5c0c32be626b.

[25] Donald Weilerstein and Christopher Neal. "Violin Technique," in *Medical Problems of the Instrumentalist Musician*, ed. Raoul Tubiana and Peter C. Amadio (New York: Informa Healthcare, 2009), 575.

research-based guidelines for imagery drawing from kinesiology, dance research, and vocal pedagogy.

Table 1. Weilerstein's Energy Images

Energy Image	Benefit
The muscles on either side of the spine are energetic and warm. (Pg. 579)	Helps the chest expand while breathing.
Energy flows up from the pelvis through the spine and muscles on either side through the left scapula, arms, and fingers into the violin. (Pg. 579)	Support the left arm.
Imagine a counter-weight hanging down from the left shoulder blade while the arm lifts lightly. (Pg. 580)	Helps lift the arm with proper back support.
The pectoral major flows out the left and beneath the shoulder. (Pg. 580)	Prevents excessive left shoulder movement and force.
The tendons in the arm and hand are "unified", and energy flows through them out the fingers. (Pg. 581-582)	Prevent shoulder and arm injuries and facilitate ease when playing in various hand and arm positions.
Energy flows up from the core and through the spine, back, shoulder, and upper arm to engage the forearm and hand. (Pg. 582, 585-586)	Facilitates finger articulation without pressing, vibrato, and shifting. Supports the right arm in bowing.
Feel energy looping between the thumb and second finger of the bow hold. (Pg. 587)	Facilitates stability and balance holding the bow.

Source: adapted from Donald Weilerstein and Christopher Neal, "Violin Technique," in *Medical Problems of the Instrumentalist Musician*, ed. Raoul Tubiana and Peter C. Amadio (New York: Informa Healthcare, 2009), 579–582 and 585–587.

2.1.3. Balance

Traditional teaching before the mid-twentieth century focused on the technical movements of the fingers, arms, and hands.[26] In *A New Approach to Violin Playing* (1961), Havas introduced the principle of finding balance in all movements and actions, and therefore eliminating all "conscious muscular action" except what is necessary for playing.[27] She explains that "if from the very beginning we create a continuous, natural see-saw-like balance in various parts of the body, the necessary movements will spring from a self-propelled action without the

[26] Paul Rolland, *The Teaching of Action in String Playing*, rev. ed. (United States: American String Teachers Association, 2007), 32.

[27] Havas, 2.

need of forced or consciously manufactured movements."[28] By teaching students to understand how the body can perform various techniques and the resulting muscular effects, students learn to play with greater freedom.[29] Like Havas, Rolland emphasizes "total body action," which describes unconscious small body movements occurring when the body is relaxed and well-balanced.[30] The hands, arms, and body move in balance with one another while playing.[31]

Balance is now generally considered the key to efficient and healthy violin technique.[32] Somatic educators Alexandra and Roger Pierce state that a "body in balance provides secure support for itself with no more muscular effort than is needed for present activity."[33] Pedagogues like Simon Fischer insist that violinists must find balance throughout the body before tackling individual left and right-hand technical issues.[34] The following sections address finding balance in the body, stance, violin hold, and left and right arms and hands.

2.1.3.1. Finding Body Balance

Balance can be learned through heightened body awareness and basic movement and postural exercises. Thompson-Robinow guides students through manual self-explorations of the skeleton, jaw, spine, shoulder/upper arm, forearm, and ribs so they learn about the locations of

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[28] Ibid., 15.

[29] Ibid., 2.

[30] Rolland, 32.

[31] Ibid., 32.

[32] Ibid., 32.

[33] Alexandra Pierce and Roger Pierce, *Expressive Movement: Posture and Action in Daily Life, Sports, and the Performing Arts* (Cambridge, MA: Perseus Publishing, 1989), 84.

[34] Fischer, *The Violin Lesson*, 163.

bones and joints and their range of motion. Students also learn about the muscles in the upper body, their range of motion, and how they support the violin and move while playing.[35] This is also an excellent time to introduce students to the concept of muscles working from the zero point. Fischer emphasizes the importance of understanding that muscles can only contract and must work in opposition to each other—no singular muscle can lengthen on its own. Joints and body parts have neutral positions wherein opposing muscle groups are balanced (neither is contracting nor stretching). Fischer calls this the "'zero point' of activity" and encourages violinists to find these finger, hand, and arm positions before playing.[36] The key to playing with freedom and efficiency is always to begin in these positions. For example, violinists should learn to suspend their arms for playing using muscles from the upper back, shoulders, and upper chest without activating the arm muscles. The muscles in the palm should contract and release when the fingers move to avoid tension. Fischer also describes finding a balance of muscle tone between being "floppy" and being tense. He proposes keeping muscle tone closer to being floppy than more in the middle of these two extremes in order to play with ease.[37]

Menuhin advocates posture exercises drawn from yoga to teach healthy alignment and balance without the instrument, such as mountain pose (Tadasana), child pose (Balasana), and balancing poses like tree pose (Vrksasana).[38] To introduce alignment, Zweig uses exercises like

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[35] Thompson-Robinow, 16–21.

[36] Fischer, *The Violin Lesson*, 168–169.
Fischer includes exercises to find the zero point of activity in the arms and hands.

[37] Ibid., 169–171.

[38] Yehudi Menuhin, *Violin: Six Lessons with Yehudi Menuhin* (New York: W.W. Norton, 1971), 18–21.

the "Hitchhiking Duck Clock" and "IU."[39] These exercises are easily learned by students of all ages. However, if the teacher only knows these (or similar) exercises and doesn't have supporting knowledge of functional anatomy and movement patterns, they may miss subtle instances of misuse and imbalances.

2.1.3.2. Balance Achieved through Body Alignment

Galamian believes teachers should not prescribe how students sit or stand, so long as the students feel comfortable.[40] Yet students may feel comfortable in unbalanced or static positions and still develop tension. Good body balance helps prevent "static tensions."[41] A healthy, balanced stance is essential in contemporary violin pedagogy, although pedagogues approach it from different perspectives. Rolland advocates for the feet to be positioned in a slight "V" and the legs able to sway gently from side to side (knees bent) to promote relaxation.[42] Havas prefers a "sailor's stance," where the weight of the body rests on the heels, spine, and shoulder blades, and the hips are pushed forward a little to counteract the violin's weight.[43] While Zweig follows Rolland's principles for the feet, she also looks over the joints of the body to make sure they are soft, open, and flexible. Similarly, Thompson-Robinow focuses on the alignment of the spine and places of balance throughout the body. She instructs students to stand with their back to a wall and notice how their body weight and center-of-gravity shifts as they sway from side to side. Thompson-Robinow favors the hips being slightly forward without the pelvis being

[39] Zweig, "Topic 1: Getting Ready to Move."

[40] Galamian, 12–13.

[41] Rolland, 33.

[42] Ibid., 33.

[43] Havas, 15.

excessively arched or tucked.[44] However, in teaching students how to sit for ensemble playing, she says to tuck the tailbone while sitting on the sitz bones of the pelvis.[45] Barbara Paull and Christine Harrison, authors of *The Athletic Musician*, warn against tucking the tailbone to flatten the lower back because it puts the spinal discs at risk.[46] But to teach students to stand up, Thompson-Robinow cues to lead from the atlanto-occipital joint (where the skull and spine meet), which is an Alexander Technique and Body Mapping concept.[47] Violinists can check in with posture and alignment every day before practicing. Weilerstein includes many warmup exercises and recommends activities like swimming, brisk walks, and cross-country skiing or ski machines.[48]

2.1.3.3. Balance and the Violin Hold

Modern pedagogues prioritize finding a balanced relationship between the head, collarbones, and arms when holding the violin. Zweig first helps students find a central position for the arms and violin by having students make a circle with their arms in front of the body and opening up into playing position while she brings the violin into their collarbone.[49] She emphasizes the importance of maintaining the feeling of the arms hanging from the ball and

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[44] Thompson-Robinow, 22–23.

[45] Ibid., 25.

[46] Barbara Paull and Christine Harrison, *The Athletic Musician: A Guide to Playing without Pain* (The Scarecrow Press, Inc., Lanham, MD, 1997), 44.

[47] Thompson-Robinow, 25.

[48] Weilerstein and Neal, 575–576.
To emphasize the importance of warming up the body, Weilerstein mentions that if he only has 15 minutes available to practice, he spends 5 minutes doing warmup exercises.

[49] Zweig, "Topic One: Getting Ready to Move."

socket joint of the shoulders in order to support the violin and bow with relaxed muscles.[50] The suspension of the arms is key to holding the violin and bow without excess tension. Menuhin explains that the violin contacts the collarbone passively and is actively held up by the left hand, which keeps the shoulders relaxed and the arms suspended.[51] Thompson-Robinow shows students how to practice rotating their forearms and how to find their arms' range of motion in order to bring them up into position safely.[52] Finding the natural suspension of the upper arms as they rotate up into position helps release the neck, shoulder blades, and back muscles.[53] To help students conceptualize arm-suspension, Fischer explains how gravity affects the arms, violin, and bow and recommends visualizing how gravity could work in the opposite direction. The image of pulling the violin and arms up creates a feeling of lightness.[54]

Because muscles can only contract, Fischer warns violinists to focus on "constant 'lengthening and widening', and to avoid 'pulling down' and 'pulling in'."[55] "Pulling down" describes the contraction of muscles in the front of the body, resulting in the chest being pulled down towards the abdomen and tension in the arms. A common sign of "pulling down" is a hunched or curved upper back. Violinists may associate certain notes, techniques, or phrases (for example, accenting a note) with a slight pulling down of the chest, which can also be seen by the

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[50] "The Remedial Process: An Interview with Mimi Zweig," interview by Vanessa Mio, *American String Teacher* 69, no. 4 (Nov. 2019): 30, https://doi.org/10.1177%2F0003131319871453.

[51] Menuhin, *Violin*, 52.

[52] Thompson-Robinow, 32.

[53] Ibid., 36.

[54] Fischer, *The Violin Lesson*,164.

[55] Ibid., 168.

scroll dipping down. To prevent this, Fischer recommends feeling the violin rising to meet the bow while playing or connecting the flattening of the violin horizontally in space with the back lengthening.[56] Thompson-Robinow recommends letting students experience the difference between unhealthy and unhealthy alignment by holding a static position to notice how the muscles start to feel strained.[57]

Violinists must also be aware of the weight of the head and the arms in supporting the instrument. Havas discovered that the head lowering forward onto the chin rest causes gripping. Instead, she, along with Menuhin and Weilerstein, suggests feeling the weight of the head more centrally and back over the spine. Havas uses the feeling of the head leaning back and nodding onto the chin rest to achieve this.[58] In contrast, Weilerstein uses the image of the "crown of the head holding the violin" in order to free the jaw, prevent the chest from "collapsing," and feel the weight of the violin more centered in the body.[59] As I will discuss in Chapter Three, arm-weight is a more abstract concept crucial to the balance of the violin, bow, and body. Some pedagogues teach arm-weight with the violin already in playing position. Thompson-Robinow has students place the scroll of their violin on a music stand in order to feel the weight of the arm hanging down and then move away. Students then practice bringing their arms up into violin position, with and without the violin, without losing the suspension of the arms.[60] Alternatively, Swartz uses off-instrument exercises and images to explain arm-weight.

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[56] Ibid., 173.

[57] Thompson-Robinow, 32.

[58] Havas, 16–17.

[59] Weilerstein and Neal, 579.

[60] Thompson-Robinow, 32–33.

2.1.3.4. Balance and the Left Arm

Problems with the left-hand frame and excessive arm tension affect left-hand balance and shifting, leading to intonation issues. Therefore, the goal of setting up the left hand is to find a dynamic hand frame and forearm positions that balance the whole arm. Zweig recommends establishing the third and fourth (pinky) fingers and reaching back to place the first and second.[61] Many beginning students are traditionally taught in first position only, which can lock their left arm and shoulder and negatively affect future shifting and vibrato.[62] Menuhin advocates starting students in the middle positions to find balanced arm and hand positions.[63] Vibrato can be a natural indicator of overall biomechanical efficiency: "if the student can vibrate beautifully, it means that everything else in the body is working correctly."[64] Left-arm tension can occur in the shoulder and arm muscles, wrists, palm, and fingers.

A. Shoulder and arm

The arm is suspended by using the muscles connecting the arm to the shoulder and shoulder blade. Twisting the left arm in unnatural positions to reach the fingerboard causes tension. Havas advocates keeping the arm suspended as vertically under the violin as possible.[65] However, the current pedagogical consensus is that it is favorable to position the arm so that the fingers can always drop from the wrist and forearm on each string, requiring some movement

[61] Zweig, "Topic 1: Getting Ready to Move."

[62] Rolland instead introduces simple shifting exercises, training the movement of the arm through all positions from the beginning of instruction. See Rolland, 32.

[63] Menuhin, *Violin*, 65.

[64] "The Remedial Process: An Interview with Mimi Zweig."

[65] Havas, 17–18.

away from vertical while reaching the lower strings.[66] Fischer highlights continual and excessive contraction of the pectoralis (pec) minor muscle as another source of tension. The pec minor can become overly involved in left-to-right movements of the elbow, when the elbow is kept close to the body, and when shifting upwards or vibrating. Fischer suggests practicing air-vibrato or air-shifting while holding onto the pectoral muscles and keeping the muscles soft.[67]

B. Wrist

In Fischer's estimation, most violinists don't comprehend the flexibility of the wrist and the support it provides for adjusting the hand frame and finger action. He suggests gently manipulating the wrist bones to discover more freedom and mobility while playing, and provides guided exercises in *The Violin Lesson* (2012).[68]

C. Palm and Fingers

Fischer observes that violinists tend to tighten their muscles from the hands through the arms right before playing. He advises releasing the hand during every opportunity to play an open string. Fischer first releases the thumb in order to release the hand. Students should map their thumb joint properly (close to the wrist) to find freedom.[69] Weilerstein explains that keeping a "loose and springy" thumb base joint and webbing between the thumb and index finger allows the thumb to move despite minor amounts of thumb counter-pressure.[70] He recommends thinking of the thumb like a "fifth finger" that shifts between the index and pinky

[66] Weilerstein and Neal, 585.

[67] Fischer, *The Violin Lesson*, 174–175.

[68] Ibid., 184–185.

[69] Ibid., 180–182.

[70] Weilerstein and Neal, 583.

fingers, depending on which one is in use to help balance the weight in the hand. (Weilerstein notes thumb placement depends on the size of the hand—smaller hands can contact the thumb using the pad; larger hands can use the pad, the base joint, or the second joint.)[71] Fischer also suggests practicing thumb movements forwards and backwards and rotations to encourage flexibility. He warns some teachers do not teach the "principle of the double contact" (both the index and thumb contact the neck) and instead leave a pencil's width distance between the index and violin, causing tension and other issues.[72] Other causes of left-hand tension include squeezing the fingers together (or its opposite, believing fingers should never touch) and keeping the fingers pointing in the same direction. Fischer advocates finding a relaxed, fan-shaped hand position by widening at the base joints.[73] Alternatively, Weilerstein chooses an expressive or harmonically important note in a group to act as a "physical pivot" for the hand balancing.[74]

2.1.3.5. Balance and the Right Arm

Tone problems may indicate tension in the right arm or other bowing issues.[75] Rolland states the right upper arm should be free and mobile to promote shoulder flexibility. Both he and Havas use the image of a teeter-totter to describe the balance of weight and body parts involved in bowing. The string is the fulcrum, and the tip of the bow and elbow are on opposite ends of

[71] Ibid., 583.

[72] Fischer, *The Violin Lesson*, 182–183.

[73] Ibid., 174.

[74] Weilerstein and Neal, 584–585.

[75] Havas, 7.

the teeter-totter.[76] Fischer notes that violinists can unintentionally involve the pectoral minor muscle excessively while bowing, which may cause bowing to feel heavy or sluggish. He recommends finding and holding onto the pectoral muscles and rhythmically contracting and releasing them by moving the arm in and out. Violinists can also practice air-bowing while trying to keep the muscles softer.[77] Rolland attributes the transfer of arm-weight to forearm rotation (pronation and supination), whereas Jonathan Swartz prefers using the fingers to transfer weight through the bow hand.[78] Rolland also highlights the role of upper arm rotation inward and outward in supporting the forearm and leveraging the weight of the arm while bowing.[79] Havas describes the feeling of the thumb as pulling the "weight of the bow tip" on a down bow and pulling the "weight of the frog" on an up-bow in order, likely as another way to conceive arm-weight.[80] A final concept of right-arm balance concerns repetitious, quick bow movements. Rolland states that two-note groups should be played with one muscular impulse to prevent tension.[81]

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[76] Rolland, 34.
See Havas, 24.

[77] Fischer, *The Violin Lesson*, 174–175.

[78] See Chapter Three for more on arm-weight.

[79] Rolland, 35.

[80] Havas, 25.

[81] Rolland, 36.

2.1.4. Natural Movements

Zweig asserts that unwanted tension can be prevented "by returning to the basic physical motions of playing, restoring and refining the natural balance of movement."[82] Pedagogues like Galamian and Flesch not only warn against excessive or exaggerated movements while playing, but consider what natural body movements are involved.[83] Havas also sets a precedent for teaching healthy movement, asserting that teachers must explain how the different parts of the body help in each action or technique and must ensure that students are using their bodies correctly instead of forcing technique to happen in order to achieve relaxed, loose feelings.[84]

Violin pedagogues' understanding of natural movement patterns and their approaches to learning them differ significantly. For example, Flesch categorizes three different areas of movement in the body: movement of the head, upper body, and lower body. His definitions of efficiency concern expressivity. The head moves forward and to the side, which Flesch perceives positively as a need to viscerally take part in feeling and creating the sound and stay focused.[85] However, he considers short jerky head motions resulting from bow accents as interfering with expressiveness and therefore inefficient.[86] Upper body movements either facilitate expressiveness (movements to the left or backwards) or prevent expression (movements to the

[82] Zweig, "Topic 1: Getting Ready to Move."

[83] See Galamian, 12–13.

[84] Havas, 18.

[85] Carl Flesch, *The Art of Violin Playing*, vol. 2, *Artistic Realization and Instruction*, trans. Frederick H. Martens (Boston: Carl Fischer, 1924), 92.
Compared to pedagogical consensus that the head balances on top of the spine, as discussed previously. However, Flesch notes that "impulsive players will always give it the preference, while reflective ones will find themselves uncomfortable when they use it, and will return as soon as possible to the straight head position."

[86] Ibid., 92.

right or bending forward). Lower body movements such as the swaying of the hips from side to side are a natural reaction to playing expressively, but Flesch cautions against it becoming a habit unrelated to musical expression.[87] In contrast, Menuhin believes all movements in violin-playing involve a wavelike combination of vertical (moving against gravity), horizontal (continuous movements creating and maintaining a flow), and lateral (swinging) motions. Each movement cycle has a "zero point" of minimum effort where the muscles are balanced. Menuhin first analyzes and trains all three movements in the fingers, hands, arms independently using preparatory exercises, making sure all joints are soft before learning to coordinate the movements.[88] Compared to Flesch and Menuhin, Weilerstein's approach to movement is more conceptual, as he considers the violinist to be "a collection of circular, vibrant energy."[89] He finds circular movements in the left arm (shifting motions and the movement of the elbow, shoulder, and back while the hand crosses the fingerboard laterally) and vertical and horizontal arcs with the bow arm.[90] Similarly, Menuhin uses coordinated arm-circles and swinging exercises to explore the body's natural motions and mobility in different directions.[91] But in contrast to most pedagogues, Menuhin's approach dives into the physics of movement. He believes understanding the speed at which a movement occurs naturally helps build awareness of

[87] Ibid., 94.

[88] Ibid., 16.

[89] Weilerstein and Neil, 590.

[90] Ibid., 590.

[91] Menuhin, *Violin*, 23–29.

when movements are being forced and causing tension.[92] However, pedagogical treatises after his *Violin: Six Lessons with Yehudi Menuhin* (1971) largely ignore these concepts.

2.1.4.1. Left Arm

Pedagogues often divide the natural movements of the left arm into the movements of the shoulders, upper arm, forearm, hand, and finger:

A. Shoulder

Children may struggle with suspending their arms without raising their shoulders. Teachers often tell students to not raise their shoulder, but Fischer also cautions against forcing it down. To find the natural movement of the shoulder, he suggests noticing what the shoulders do when you hug someone and apply that to holding the violin.[93] According to Menuhin, the shoulder reacts to the movements of the arm. He uses the example of shifting upwards, where the violin and arm raise up while the shoulder relaxes down.[94] Weilerstein warns against twisting the shoulder unnaturally when reaching the fingers towards the fingerboard.[95]

B. Upper arm

The upper arm, shoulder, and back muscles work together during large shifts up over the bout in a "scooping arc motion."[96] The whole arm prepares the shift by adjusting the angle of the

[92] Ibid., 25.

[93] Fischer, *The Violin Lesson*, 178–179.

[94] Menuhin, *Violin*, 61.

[95] Weilerstein and Neal, 580.

[96] Ibid., 584.

fingers to be more on their left side, leading to more efficient movements.[97] To facilitate moving across the fingerboard, the whole arm moves laterally.[98]

C. Forearm

Weilerstein recommends using forearm pronation and supination instead of twisting the arm, elbow, or wrist to help the fingers reach the fingerboard.[99] However, his explanation of how forearm rotates is not as anatomically detailed as Body Mapping teacher Jennifer Johnson's in *What Every Violinist Needs to Know about the Body*. Menuhin notes the forearm facilitates shifting and vibrato motions as well.[100]

D. Hand and fingers

Fingers move from the base joints to drop onto the fingerboard. Fischer recommends tapping exercises to develop this action.[101] Violinists must beware of excess finger pressure, which causes the thumb to press against the neck and which affects tone negatively.[102] Menuhin's primary emphasis is on relaxing the thumb and developing its mobility.[103] He states that the more flexible the thumb joint is, the more easily the elbow can swing right, affecting the height and angle of the knuckles on the fingerboard.[104] Fischer recommends three methods for

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[97] Ibid., 584.

[98] Menuhin, *Violin*, 67.

[99] Weilerstein and Neal, 580.

[100] Menuhin, *Violin*, 65.

[101] Fischer, *The Violin Lesson*, 187.

[102] Ibid., 189.

[103] Menuhin, *Violin*, 52.

[104] Ibid., 60.

releasing finger pressure: violinists can start with too little thumb pressure, and then add only enough to achieve the desired tone. Alternatively, violinists can add a little arm-weight to replace finger pressure and let the fingers feel like they are hanging from the fingerboard. Finally, they can roll the fingertip onto the string.[105] Weilerstein reminds violinists to release the left fingers into the hand naturally instead of squeezing the fingers inward or spreading them apart unnaturally.[106] Regarding finger placement, Fischer discovers that the "only time that you need to drop a finger on the string with speed and impact is in ascending slurs. Playing all other notes the finger should be placed."[107] Gentle finger placement helps keep the hand from being too tight when using a little extra articulation/energy as a finger accent.[108] Weilerstein also suggests placing fingers more on the left side of the pads and string in order to have flexible intonation, prevent pressing, and make shifting easy.[109]

2.1.4.2. Right Arm

Pedagogues mostly agree on the natural movements of the right arm. Bowing motions can be analyzed either as integrated movements or separately by body part. One of the first pedagogues to do the latter was Galamian in *Principles of Violin Playing and Teaching* (1962). Table 3 in Chapter Three shows how Galamian breaks down the movements in the right arm in the context of functional movement patterns. Rolland divides bowing movements into free ("ballistic") movements and slow, controlled movements. **Ballistic movements** (such as *martelé*,

[105] Fischer, *The Violin Lesson*, 189–191.

[106] Weilerstein and Neal, 582.

[107] Fischer, *The Violin Lesson*, 186.

[108] Ibid., 186.

[109] Weilerstein and Neal, 581.

spiccato, and faster *detaché* bow strokes) are initiated by a thrusting motion followed by passive arm movement. In slow, sustained strokes, opposing arm-muscle groups stay contracted, creating a "light tension" helping with sustaining long notes and maintaining tone.[110] Menuhin takes a slightly different approach, describing the ballistic movement as a "smack-bounce": a quick thrust of the upper arm in one direction, followed by a recoil in the opposite direction. Unlike Rolland's ballistic movement, this movement is intended for bow changes despite its aggressive qualities. However, Menuhin views this motion as helpful for developing elliptical arm movements.[111]

A. Upper arm and body

Pedagogues have various opinions regarding coordination of the movements of the arm and body. Flesch, Rolland, and Fischer advocate moving in the same direction as the bow arm (unilateral motion) during long, sustained strokes and moving in the opposite direction (contra-lateral motion) during short notes.[112] In contrast, Weilerstein shifts his bodyweight from one foot to the other while moving the bow in the opposite direction in order to cause more friction between the bow-hair and the string during long, sustained notes.[113] Both Rolland and Menuhin highlight the role of the circular, swinging motions of the upper arm and forearm in playing with full bows.[114] Menuhin recommends training the integrated movement of the shoulder, arm, and hand by moving the hand up and down the bow while it is held in the left hand or the frog placed

[110] Rolland, 37.

[111] Menuhin, *Violin*, 45–46.

[112] See Flesch, 95; Rolland, 34; and Fischer, 176–177.

[113] Weilerstein and Neal, 591.

[114] See Rolland, 39; and Menuhin, 44–45.

on a music hand.[115] Weilerstein also considers the length of the violinist's arm in bowing. If the student struggles with reaching the tip, he suggests bringing the violin into the bow with a slight movement to the right.[116]

B. Forearm

Many pedagogues like Weilerstein and Galamian pronate and supinate the forearm while moving to and from the frog and tip to help keep the bow arm dynamic and the wrist from locking.[117]

C. Hand and fingers

In a flexible bow hold, the fingers move in three directions: vertically from the third joint of the fingers, horizontally through pronation and supination, and rolling the bow forward and backward between the fingers and thumb.[118] Both Menuhin and Havas start with the natural curve of the thumb and hand meeting.[119] Havas identifies a loose, flexible thumb as the cause of natural and effortless wrist and elbow movements.[120] Menuhin goes into more extensive detail than do most pedagogues, claiming the bow hold is constructed from two shapes: the circle made by the thumb and second finger and a bridge made by the knuckles of the first through fourth fingers on the stick. He states each shape has its own movement: contrary movement between the thumb and second finger while bowing and the knuckles slightly spreading during up and down-

[115] Menuhin, 40.

[116] Weilerstein and Neal, 586–587.

[117] Ibid., 587.

[118] Zweig, "Topic 1: Getting Ready to Move."

[119] See Havas, 23; and Menuhin, 33.

[120] Havas, 25.

bow strokes. These two movements create the circular motion of the bow hand.[121] Other pedagogues like Weilerstein instead view the second finger as a pivot finger around which the rest of the hand balances around while bowing.[122]

It should be noted not every pedagogue addresses these areas of the upper body individually, and most explanations lack anatomical specificity.

2.1.5. Breath and Movement

Breathing is an integral part of healthy violin-playing. Menuhin considers training the breath to easily and continuously breathe while playing as one of his general principles of violin technique. He prescribes yoga-based breathing exercises like measured (counted) breathing and alternate nostril breathing.[123] Both Thompson-Robinow and Weilerstein advocate diaphragmatic breath support. Thompson-Robinow warns against thoracic (chest) breathing and provides guided breathing exercises for students in *The Embodied Violinist* (2017).[124] Many similar instructions for diaphragmatic breathing suggest placing a hand each on the abdomen and chest and breathing while keeping the hand on the chest still. While Thompson-Robinow likely has in mind students who breathe shallowly or raise their shoulders while inhaling, these instructions are anatomically misleading. The ribs attach at the spine and angle downwards as they come around to the front of the body. During inhalation, the intercostal muscles between the ribs and other muscles, like the scalene muscles, pull the ribs in both anterior (forward) and lateral (side) directions. Yoga teacher Bernie Clark uses the image of a bucket handle lifting to describe this

[121] Menuhin, *Violin*, 33–35.

[122] Weilerstein and Neal, 588.

[123] Menuhin, Violin, 17.

[124] Thompson-Robinow, 24.

motion of the ribs on the front side of the body while breathing. This means there is chest movement even when focusing on the diaphragm. Clark notes that most people use a combination of chest and belly breathing, depending on their age, gender, and health concerns. (For instance, women's ribs angle down more than do men's ribs, so women may have more chest movement in order to have enough room for the lungs to expand.)[125]

Weilerstein engages the diaphragm intentionally during musical upbeats. He explains, "just before you play, breathe out from the diaphragm—just enough to sing or even speak that upbeat with the word 'and' to lead you into playing."[126] This helps with sound production and fluidity while playing. He also encourages awareness of the breath and chest expansion while changing bow direction at the frog to prevent right arm tension and injury.[127] Anxiety and loss of concentration can affect breathing and lead to jaw tension. Weilerstein recommends using mindfulness and other breathing exercises like the "whispered 'ah'" of Alexander Technique to improve focus and reduce stress before playing. These breathing exercises can even help with violin techniques like shifting.[128]

2.1.6. Tension

Tension may occur because of issues with balance and movement. Fischer notes tension usually begins in the neck and shoulders before spreading to the arms, hands, and fingers. He

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[125] Bernie Clark, "Are You a Belly Breather or a Chest Breather? Does It Matter?," Yoga International, accessed April 1, 2021, https://yogainternational.com/article/view/are-you-a-belly-breather-or-a-chest-breather-does-it-matter.

[126] Weilerstein and Neal, 590.

[127] Ibid., 587.

[128] Ibid., 576–577.

warns that small technical issues can cause chain reactions of tension across the body.[129] (For more on chain reactions, see Chapter Four.) Zweig encourages teachers to check that students are playing with ease. Elements to review with beginners include the "lengthening of the body, shoulders down, relaxed arms, fluid ball and socket joints in both arms, head loose with a relaxed jaw, teeth not clenched together, loose tongue, right thumb not pressing up on the bow, and the relaxation of left hand fingers after playing."[130] Tension also occurs because of psychological aspects of learning, playing, and practicing. Zweig insists that a non-judgmental learning environment helps students feel less anxious and reduces tension in lessons.[131] Cellist and injury prevention educator Janet Horvath notes beginning students may be afraid of dropping the violin and clench the instrument. She suggests practicing above something soft (like a bed) or resting the scroll on a bookshelf or music stand to support the weight of the violin.[132] Fischer hypothesizes that violinists ignore pain and tension while playing because they believe thinking about playing in "relaxed, balanced, non-squeezing ways" interferes with their ability to play musical or causes cognitive overload. Musical phrases and passages then become associated with postural issues or tension in the muscle memory.[133] Similarly, Weilerstein notes violinists

[129] Fischer, *The Violin Lesson*, 163–164.

[130] Mimi Zweig, "String Pedagogy Suzuki Book One Check List," StringPedagogy.com, accessed March 30, 2021, http://www.stringpedagogy.com/members/?submissionGuid=d99cbe35-ac33-4d21-86e7-e02dd79d44b8.

[131] Zweig, "Topic 1: Getting Ready to Move."

[132] Janet Cellist , *Playing (Less) Hurt: An Injury Prevention Guide for Musicians* (Milwaukee: Hal Leonard Books, 2010), 94.

[133] Fischer, *The Violin Lesson*, 163.

experience tension "due to lack of flow or trying too hard."[134] He encourages violinists to connect with their intentions for playing and to practice with imagery.

2.1.7. Musicality and Stiffness

Flesch observes stiffness in technically proficient violinists who play with little musical expression. He attempts to resolve this problem by teaching students to sway from side to side at their hip joints without the violin and then by coordinating bowing with body movements in the same and opposite directions. By practicing legato studies like Rode's Caprices (nos. 3, 11 and 13) both ways, students learn to be aware of how the body instinctively wants to move while playing.[135] Weilerstein looks to the upper body, where subtle movements of the violin correspond with a mental image of the music.[136] He connects the energy of fingers releasing from the string to the tempo and the rhythm of the music.[137] Pierce and Pierce expand on this idea, explaining that musical phrases are not "shaped just by the arms, hands, and fingers but also by the swaying and nodding movements of trunk and head. If those movements are poorly formed, if they do not suit the laws of motion that are inherent in the body's structure, the phrases will sound ill-timed and lack fullness."[138] Alexandra Pierce believes embodying musical beats, melodies, and phrases as movements helps students interpret music as a whole-body experience. She combines theoretical analysis of repertoire with kinesthetic interpretations of musical elements like harmonic resolutions and cadences of phrases, melodic contour, rhythmic

[134] Weilerstein and Neal, 577.

[135] Flesch, 94–95.

[136] Weilerstein and Neal, 579.

[137] Ibid., 582.

[138] Pierce and Pierce, 87.

articulations, structural harmonic movement, phrase lengths, musical climax, reverberation (the resonance of sound as it releases), silence and transitional moments, motives and motivic development, and tone, color, and character.[139] Thompson-Robinow and Rolland take a more rhythmic approach to movement and musicality. Thompson-Robinow regularly teaches a dance step to students to be played with syncopated scales and arpeggios.[140] Rolland believes integrating some kind of rhythmic practice or activity in each lesson for the first two years of instruction "establishes the foundation for well-coordinated movements but also provides diversion and relieves fatigue."[141] He includes activities like marching, tapping on the fingerboard or collarbone, and clapping to the pulse of the music.[142]

2.1.8. Remedial Pedagogy

Fischer compares playing the violin to learning a foreign language, likening technical elements to words and syllables combined to form sentences. He stresses the importance of detecting gaps in students' "technical vocabularies" which lead to inefficient playing.[143] However, many precollege teachers may not know how to effectively communicate technical concepts or to ensure students continually meet pedagogical standards as they progress.[144] Not

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[139] Alexandra Pierce, *Deepening Musical Performance through Movement: The Theory and Practice of Embodied Interpretation* (Bloomington, IN: Indiana UP, 2010), 2–5.
Pierce's methodology combines Schenkerian structural forms with somatic principles from Ida Rolf, who developed Structural Integration—known more commonly as Rolfing.

[140] Thompson-Robinow, 26–27.

[141] Rolland, 43.

[142] Ibid., 43.

[143] Fischer, *The Violin Lesson*, 103–104.

[144] Mio, "The Need for Remedial Pedagogy," 37.

properly addressing posture and form in the beginning stages of violin-playing may cause tension, faulty sound, technical difficulties in the left hand (such as shifting and vibrato), and overall lack of body awareness.[145] Students' lack of pedagogical understanding or mistaken beliefs may affect their future teaching as well.[146] This highlights the importance of **remedial pedagogy**, a process in which "students rewire their conditioned motor responses and relearn fundamental technical/musical skills to benefit their artistic expression and future teaching proficiency."[147] Many postsecondary students go through the remedial process in their first year of collegiate study. For example, Mimi Zweig takes all her students, no matter their current playing level, through a remedial foundational sequence. Students typically need to gain an understanding of bow strokes and bow division, left-hand shape for ease and efficiency, and shifting.[148]

Rolland identifies three primary forms of remediation:

1. **Developing an awareness of unhealthy or undesirable motor patterns and replacing them with new patterns.**[149] This approach succeeds if students first gain awareness of their unhealthy or undesirable motor patterns, lest students subconsciously activate them while playing.[150]

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[145] Ibid., 37.

[146] Vanessa A. Mio, "An investigation of postsecondary violin instructors' remedial pedagogy: A case study," *International Journal of Music Education* 36, no. 2 (2018): 298, https://doi.org/10.1177%2F0255761417731439.

[147] Ibid., 298.

[148] "The Remedial Process: An Interview with Mimi Zweig."

[149] Rolland, 182.

[150] Ibid., 179.

2. **"Ideation" of healthy movement patterns.** Teachers first demonstrate and describe the new movement patterns. Then students use imagery to practice movements without physically doing them.[151] This method is more successful with older and more advanced students and with students struggling to adopt new motor skills.[152]
3. **Practicing movements that are similar but not identical to violin-playing.**[153] This approach works well with children "who follow instructions offered through sensory images, analogies, metaphors, and similes much better than through rational explanations."[154]

When replacing movement patterns with new ones, students may find the older, familiar patterns more comfortable, reliable, and feeling "right." Remedial work requires student motivation and commitment to make changes. However, Rolland is uncertain whether violinists over 40 can or should attempt to change motor patterns.[155]

Through remediation, students gain an awareness of their movement patterns, learn different nervous system patterns, and understand how to move and play in ways that improve expressiveness, ease, and pedagogical understanding.[156] Another important way to build motor

[151] Ibid., 180.

[152] Ibid., 182.

[153] Ibid., 180.

[154] Ibid., 182.

[155] Ibid., 179–180.

[156] Mio, "The Need for Remedial Pedagogy," 37.

skills is frequently to review repertoire and techniques, but Rolland cautions to only review techniques and movements that are healthy and correct.[157]

Part II: The Role of the Teacher in Diagnosing and Preventing Injuries

Performance-related muscular disorders (PRMDs) have been a significant concern for musicians since 1987, when the International Conference of Symphony and Opera Musicians released a survey, which found that 76 percent of professional orchestral musicians experience serious injury.[158] While injury rates are highest among professional musicians ages 35–45, precollege and collegiate musicians also experienced high rates of PRMDs.[159] Experts in performing-arts medicine recommend a collaborative approach to treating musicians, involving the physician, applied teacher, and other health practitioners.[160] Injured violinists should consult with health professionals regarding specific treatment options. Physicians may prescribe physiotherapy, splints, strengthening exercises or stretches, and anti-inflammatory drugs to treat tendon pain and nerve impingement.[161] Speck acknowledges difficulties in finding appropriate treatment and suggests the injured musician consult with colleagues and mentors who have

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[157] Rolland, 179.

[158] *Senza Sordino: Official Publication of the International Conference of Symphony & Opera Musicians* 24, no. 6 (Aug. 1987): 7, https://www.icsom.org/senza/issues/senza256.pdf.

[159] Horvath, 7.

[160] Buchanan and Hays, 4.

[161] Alan H.D. Watson, *The Biology of Musical Performance and Performance-Related Injury* (Lanham, MD: The Scarecrow Press, Inc., 2009), 77–78.

successfully worked with health professionals.[162] The Performing Arts Medicine Association offers many resources and referrals to performing arts medicine specialists, although specialists may not be located nearby. It is important for teachers to reach out and create a network of performing arts medicine clinicians and resources to recommend to their students.[163]

Teachers must be prepared in applied lessons to help students struggling with pain. Traditional steps for dealing with injuries include telling the student to stop playing and rest, using ice to relieve pain and heat for chronic injuries, seeking out professional medical advice, adopt a positive mindset about the injury and recovery process; and also analyzing the student's technique, posture, schedule, lifestyle, muscular weaknesses and imbalances, and daily activities.[164]

To determine potential causes of pain and tension, pianist Leslie Sisterhen McAllister recommends asking the following questions:

1. **Does the student experience pain during practicing only or during specific pieces/passages? Does the pain go away after practicing?**[165] Look at the technical and anatomical demands of the repertoire being played. Is there a particular string, double-stop, or bow stroke repeatedly being used that creates tension or uncomfortable

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[162] Laura Speck, "Overuse Injury and Body Awareness in String Players: A Resource Guide for Educators and Performers," (DMA diss., Arizona State University, 2009), ProQuest Dissertations & Theses Global, 68.

[163] "Where Do We Start In Learning About Musicians' Health?" hosted by Janice Ying and Kayleigh Miller, *Beyond the Practice Room*, podcast, Dec. 21, 2020, 45:49.

[164] Horvath, 148–150.

[165] McAllister, *The Balanced Musician*, 334.

positioning? What bone, muscles, and/or tendons are involved in the area of pain?[166] How severe is the pain? A 5-grade physiotherapy scale to measure pain is shown in table 2. Grade I pain can be resolved through education and ergonomic adjustments, but Grade II-V pain requires professional treatment.[167]

2. **Is the pain caused by overuse, misuse, or is it nonmusical?**[168] Ying and Miller investigate when the student experienced pain. Was it sudden, or did it slowly develop over time? Does the student have any performance demands, such as long rehearsals or an upcoming recital, competition, or audition, on top of their usual workload? What extra-musical factors or activities are part of their daily life? Could there be an issue with their instrument affecting their playing and pain?[169] Horvath provides an injury susceptibility quiz to help diagnose factors contributing to overuse and pain.[170]
3. **Has the student made any practice modifications?** Has the student increased their practice load and number of hours recently? Have they added in rest periods or other modifications to help address the pain?
4. **What steps have the student already taken to address their pain?** The teacher can make specific performance and practicing recommendations based on the student's current injury prevention routine.[171] Weilerstein finds that violinists who think they're

[166] "Where Do We Start In Learning About Musicians' Health?"

[167] Paull and Harrison, 9.

[168] McAllister, *The Balanced Musician*, 334.

[169] "Where Do We Start In Learning About Musicians' Health?"

[170] Horvath, 25.

[171] McAllister, *The Balanced Musician*, 334.

fully recovered from tendinitis issues may experience recurring pain. Their tendency is to get excited about playing without pain and practice too much without building up their endurance incrementally. It is better to take at least two days off from practicing and beginning a return-to-playing schedule building from 5 to 10 minutes of practicing per day.[172]

Teachers should routinely monitor students' posture and alignment for any tension or restrictions, both closely enough to see small details like fingering and far enough away to see the whole body.[173] However, Ying and Miller caution teachers to never assume they know what the problem is. Both the context and a thorough knowledge of functional anatomy are important in determining causes of injury.[174]

Table 2. Physiotherapists' Graded Descriptions of Pain

Physiotherapy Grade	Description of Pain
I	Pain after playing, but it doesn't affect performance.
II	Pain while playing, but it doesn't restrict performance.
III	Pain while playing, and the musician must adjust their playing position or stop.
IV	Pain immediately after starting to play, and it is too severe to keep playing.
V	Pain occurs in all daily activities. No playing is possible.

Source: adapted from Barbara Paull and Christine Harrison, *The Athletic Musician: A Guide to Playing without Pain* (The Scarecrow Press, Inc., Lanham, MD, 1997), 9.

Tension due to overuse and environmental factors can be addressed through injury prevention solutions, whereas tension arising from anxiety, postural issues, and habitual movement patterns in daily life and while playing can be addressed through the mind-body

[172] Weilerstein and Neal, 574–575.

[173] Ibid., 334.

[174] "Where Do We Start In Learning About Musicians' Health?"

connection and movement re-education solutions. Because collegiate institutions may not offer injury prevention or musicians' wellness courses, violinists must take responsibility for educating themselves and their students about injury prevention strategies, relaxation training in the form of breathing exercises and mental imagery, and body awareness. Some violinists may outsource this work to somatic educators like Alexander Technique, Body Mapping, and Feldenkrais teachers, who prioritize whole-body approaches, developing awareness, and retraining fundamental movements to improve overall function and efficiency. Somatic methods can also address another factor contributing to tension: the expressive nature of movement. In Pierce and Pierce's estimation, all movement expresses one's attitude and character, representing the "manifestation of all the choices [someone] has made or that have been imposed upon [them] in the past."[175] They suggest that movement patterns may reflect repressed emotional energy or anxiety, which manifests as tension in the body.[176] This emotional/psychological element of movement may be a crucial element of healing from injury or finding greater ease and freedom while playing. However, some violinists may not have access to practitioners or the resources to study extensively to resolve their specific movement issues.

Commentary

Teachers can benefit from being able to accurately diagnose postural and technical inefficiencies based on a firm understanding of anatomy and physiology, provide successful movement interventions, and tailor their instruction to fit individual students and learning styles. These concepts and skills are woefully lacking for violin performance majors in collegiate musical institutions. While historically, violin pedagogues have thoughtfully considered the role

[175] Pierce and Pierce, 15.

[176] Ibid., 16.

of movement in violin-playing and teaching, their treatises generally lack anatomical specificity and rarely include information based on current biomechanical research. Their conceptual explanations of violin technique may be an effective approach for working with a beginner or young student, but the violin teacher should consider having a thorough understanding of the anatomical basis for those techniques in order to ensure the student is moving safely and efficiently. Many students require remediation to fix longstanding issues with tension, alignment, and technique, but if teachers use these same conceptual ideas of movement and balance to fix problems in the remedial stage, they may be unable to accurately identify and resolve causes of tension in the student.

Most violin teachers lack the pedagogical background to facilitate physiological changes to technique. They need to learn how to communicate information successfully so students play with greater efficiency and less risk of injury, and mentor students to methodically self-monitor their movement and technique during practice sessions. The handbook that concludes this document aims to provide a nuanced approach to learning and teaching violin technique from a kinesiological, or movement-based, perspective and bring together a wide range of materials under one pedagogical system for easy reference. The following chapters summarize essential theoretical components of each QMD stage and give examples and suggestions for implementation in the violin lesson, referencing relevant research in violin and music pedagogy.

Chapter Three: Required Knowledge for QMD

The Preparation Stage

This chapter discusses the relevant knowledge required for QMD, acquired during the preparation stage of QMD prior to the violin lesson. In order for QMD to be accurate and up-to-date, violin teachers need to establish and continually review their prerequisite base of knowledge about violin-playing and teaching. This chapter explores and contextualizes the three major areas of prerequisite knowledge required for QMD—knowledge of the activity, knowledge of the performer, and knowledge of effective instruction—within the fields of violin performance and pedagogy, and provides suggestions for addressing knowledge gaps.[1]

Part I: Knowledge of the Activity

Knowledge of the activity consists of the specific skills, strategies, and physical requirements of violin-playing needed to have clear goals for QMD and teaching movements at various developmental stages.[2] Of the four stages of QMD, the preparation stage is the most theoretical and abstract and may be overwhelming at first glance. However, the concepts outlined in Part I are essential to performing meaningful and effective observations, evaluations, and interventions and can be learned independent of each other. Part I discusses sources of knowledge, building a foundational knowledge of anatomical and biomechanical information, and pedagogical knowledge required for effective QMD.

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[1] Knudson, 76.

[2] Ibid., 76–77.
While knowledge of rhythm, theory, musical expressivity, history, and aural skills is essential to teaching violin, knowledge of the activity in QMD focuses exclusively on movement-based elements.

3.1.1. Sources of Knowledge and Their Pros and Cons

Instructors gain knowledge of their activity through three primary sources: experience, expert opinion, and scientific research.[3] Each source of knowledge has its own advantages and disadvantages.

3.1.1.1. Sources and Problems with Experience

Violinists gain experience through extensive years of studying and performing and through teaching. Knudson observes that "thoughtful coaches are likely to make valid generalizations from experience if their players are relatively homogeneous."[4] A teacher working only with elementary-age children who have highly involved parents in lessons and practicing or a conservatory professor working with advanced students is more likely to have similar experiences from student to student than a teacher working with a variety of ages, technical levels, self-regulation skills, and parental involvement. Knowledge based on experience also draws on anecdotal evidence subject to personal biases. This knowledge cannot be verified by scientific method. Nor can it account for all factors contributing to the experience.[5] A student's physiology, socio-economic factors, learning style, and studio environment all influence their experience learning the violin. And many violinists carry on pedagogical traditions learned in their own applied studies with specific teachers.

3.1.1.2. Sources and Problems with Experts

For violinists, expert opinions can be found in pedagogical treatises and resources, journals, conferences, masterclasses or workshops with expert teachers, and, recently, through

[3] Ibid., 77–78.

[4] Ibid., 77.

[5] Ibid., 77.

social media. (For instance, violin soloist Hilary Hahn shares practice tips on her Instagram account and YouTube channel.) However, violinists must be aware of five potential weaknesses in expert knowledge.[6]

A. Expert bias

Professionals can have personal biases depending on with whom they studied violin, their body type, their experiences playing and teaching, and what alternative pedagogical or movement methods with which they have been exposed.

B. Opinions change

In athletics, motor skill learning is influenced by the technique of current high-level athletes and the agendas of experts.[7] Violinist Jonathan Swartz explains that "over the years, improvements to violin technique have come in many forms, ranging from a change in the executions of techniques, to better descriptions of the executions and/or applications of techniques."[8] In the past few decades, increasing interest in integrating somatic practices and information from performing-arts medical practitioners has begun to change principles of posture, alignment, movement, and practicing in violin-playing.

C. Current thought may not be best

As seen in Swartz's analysis of Baillot's *L'Art du violon* (published in 1835), treatises may propose modern concepts, such as using the fourth finger to support the weight of the bow as it approaches the frog, and yet also encourage principles contrary to biomechanical principles

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[6] Ibid., 77–78.

[7] Ibid., 78.

[8] Jonathan Ward Swartz, "Perspectives of Violin Pedagogy: A Study of the Treatises of Francesco Geminiani, Pierre Baillot, and Ivan Galamian, and a Working Manual by Jonathan Swartz" (DMA diss., Rice University, 2003): 1, ProQuest Dissertations & Theses Global.

of healthy playing, such as not bending the thumb and raising the wrist while bowing at the frog.[9] Although many strides have been made towards incorporating more biomechanically informed principles in violin-playing, pedagogical practices continue to espouse traditional viewpoints. For example, many violin teachers "disallow any of the natural curve at the back of a wrist in neutral in order to prevent students from trying to support the neck or shoulders of the violin with an extremely extended wrist ('pancake hands')," but a neutral wrist means, in fact, that the hand slopes back a little.[10] Current pedagogical principles may continue to evolve in the next decades as more violinists work with movement experts and performing-arts medical practitioners.

D. Experts disagree

As will be demonstrated in later sections, violin pedagogues disagree on key aspects of violin technique. In "A Physiological Approach to Posture as a Basis for Violin Technique," Lee presents many examples of contradictory instructions in frequently used violin treatises for technical elements such as violin angle, tilt, hold, and placement. A performing arts medical professional or somatic movement expert may also disagree with an expert violin teacher regarding anatomical use and the functional movement patterns involved in technique. Violinists must weigh these additional perspectives and be willing to adjust their teaching as needed.

E. Research shows expert opinions may be false or mistaken

[9] Ibid., 18–20.

[10] Jennifer Johnson, *What Every Violinist Needs to Know about the Body*, (Chicago: GIA Publications, Inc., 2009), 166.

Professionals suffering from the curse of expertise may not understand what is happening physiologically while they are playing.[11] As violinists rarely receive functional anatomy training in their performance and pedagogy classes, they lack a clear understanding of the bones, muscles, and functional movement patterns involved in violin-playing. Body Mapping educators refer to these misunderstandings as "mis-mappings," and Jennifer Johnson includes a list of nearly fifty common mis-mappings in *What Every Violinist Needs to Know about the Body*.[12] Similarly, teachers have often recommend violinists rotate or tilt their head to line up their eyes with the scroll of the violin, but medical researchers find this can result in neck muscle imbalances over time.[13] Recent research also provides new insights into the relationship between biomechanics and sound. Violinist Alexandra Hiew suggests that violinists misunderstand the relationship between the three basic parameters for bowing: the speed of the bow, the pressure of the bow on the string, and the contact point of the bow between the bridge and the fingerboard. Many violinists emphasize increasing bow pressure through arm-weight to change dynamics, but bow-string interaction studies reveal that bow pressure is less influential than the contact point or bow speed when changing dynamics.[14]

Teachers and performers benefit from understanding human biomechanics, musculature, and anatomical differences when adopting individualized approaches to playing and teaching the violin. Violinist Chayong J. Lee argues that traditional violin pedagogy lacks the physiological

[11] Knudson, 78.

[12] Johnson, 161–181.

[13] Chayong J. Lee, "A Physiological Approach to Posture as a Basis for Violin Technique" (PhD diss., Texas Christian University, 2015): 34, ProQuest Dissertations and Theses Global.

[14] Alexandra Hiew, "Towards a Pedagogical Reference Work for Violinists Informed by Current Music Psychology Research" (DMA diss. University of Cincinnati, 2012): 74, ProQuest Dissertations & Theses Global.

approach necessary to understand or refine technique, citing music physiotherapy researchers Bronwen Ackermann and Roger Adams' conclusion that pedagogical treatises rely on prior experience, tradition, and personal opinion rather than scientific fact.[15]

3.1.1.3. Sources and Problems with Science

Biomechanical and physiological research in performing-arts medicine lags behind that of sports physiology.[16] However, several recent studies contribute to a growing knowledge base on the physiological aspects and injury risks of music performance. As with knowledge based in expertise and expert opinions, there are several difficulties with using scientific research.

A. Experimental research doesn't apply to reality

Experimental research controls limit real-world validity.[17] Many studies rely on small sample sizes and only require the violinists taking part to perform short excerpts or patterns in laboratory settings instead of recreating a real-life practice or performance environment.

B. Difficult to understand

Complex terminology or abstract topics and design make reading studies more challenging.[18] Violin teachers tend to not readily embrace "implications of pedagogically driven scientific research" because scientific terminology may confuse readers, and teachers tend to teach similarly to the way they were taught.[19]

C. Difficult to access or find accurate studies

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[15] Lee, 3.

[16] Ibid., 3.

[17] Knudson, 79.

[18] Ibid., 79.

[19] Hiew, 119–120.

In a systematic review of ergonomic factors influencing muscle activity and performance-related medical disorders (PRMD), Chi et al. decide they cannot draw any overall conclusions because of poor reporting of EMG data and quality issues with many studies' methods. They stress the need for more research on ergonomic setups for violinists using "appropriate measuring devices and analytical approaches to increase methodological quality."[20] Online databases, websites, blogs, and articles also allow inaccurate or biased research to be easily accessed.[21] Despite these concerns, professionals should "weigh all the evidence for or knowledge about activities based on their experience, expert opinion, and research to establish the most valid background knowledge for QMD," with Knudson arguing that scientific research should receive the most weight.[22] Violinists may find more reliable studies in journals like *Medical Problems of Performing Artists*.

3.1.2. Establishing Knowledge of Anatomy, Alignment, and Movement Patterns

The most important aspect of teaching, Fischer believes, is to continually fill in knowledge gaps and update and refine your knowledge by learning about great performers and teachers, studying treatises, going to concerts, listening to recordings, and watching videos.[23] An in-depth study of the body is equally important. Students usually go to their applied teachers before they seek professional help with injuries and pain, so it is essential for teachers to give

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[20] Ju-Yang Chi, Mark Halaki, and Bronwen J. Ackermann, "Ergonomics in violin and piano playing: A systematic review," *Applied Ergonomics* 88 (Oct. 2020): 12–13, https://doi.org/10.1016/j.apergo.2020.103143.

[21] Knudson, 79.

[22] Ibid., 79–80.

[23] Fischer, *The Violin Lesson*, xix.

anatomically sound advice.[24] Learning anatomy, biomechanical principles of alignment, and fundamental movement patterns is necessary for effective QMD.

3.1.2.1. Incorporating Anatomical Knowledge

Before offering advice to others, teachers first need to understand their own body, movement, and playing characteristics. Ying and Miller encourage teachers to study what applies to their bodies and instruments. Studying a somatic method is a popular approach, but which method is best for the individual? Most somatic methods teach body awareness, some using more exploratory approaches, some using more directives. Experimenting with different approaches helps violinists determine which approach, or "somatic language," resonates with them personally. Other factors to consider include availability, fitness, and the somatic teacher's experience and teaching style.[25]

Studying anatomy is an essential part of learning about the body. Ying and Miller offer the following recommendations in order to avoid being overwhelmed by all the information:

1. **Start from a place of curiosity**. Articulate why you want to learn functional anatomy. For example, it is important for a musician to understand how and why the body moves while playing their instrument.
2. **Start with a body part you find interesting**. It is helpful to start with bones.
3. **Keep things simple**. Knowledge of the general location of a muscle suffices for beginners. What direction causes a specific muscle to contract? What muscles work in groups or act as antagonist muscles stabilizing a specific movement?

[24] "Where Do We Start In Learning About Musicians' Health?"

[25] Ibid.

4. **Embody what you learn**. Be able to relate what you learn to what you feel and use while moving.

There are many resources for studying anatomy. Violinists can take a functional anatomy course or independently study anatomy texts.[26] Somatic methods emphasizing musician-specific anatomy include Body Mapping and Timani, a Norwegian-based movement method for musicians teaching anatomy, movement analysis, the mechanics of connective tissue, breathing, mind-body awareness, and the forces involved in playing an instrument.[27] Alternatively, some musicians use the Franklin Method to teach functional anatomy images related to playing.[28] Anatomy apps provide visual references for personal study and during applied lessons. Teachers can reference a specific body part, showing a 3D image, to help explain to students why they want to address a technical or movement-based issue.[29] Alternatively, teachers can guide students through manual explorations of their bones.[30]

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[26] Ibid.
Ying and Miller recommend Biel's *A Trail Guide to the Body* and Kapit and Elton's *The Anatomy Coloring Book.*

[27] "About Timani," Timani, accessed March 16, 2021, https://www.timani.no/en/about-timani/.
While Timani is only currently offered in lessons and courses, a textbook in English will be available beginning in summer 2021. For future reference, see Tina Margareta Nilssen, *Unleashing the Potential of the Musician's Body: Timani anatomy and exercises for healthy playing and singing*. Oslo, Norway: Norsk Musik Forlag Edition, 2021.

[28] Josie Bray, "Music and the Franklin Method: An Interview with Hanna Keßeler," The Franklin Method, accessed March 16, 2021, https://franklinmethod.com/music-and-the-franklin-method-an-interview-with-hanna-keseler/.

[29] "Where Do We Start In Learning About Musicians' Health?"
Ying and Miller recommend the "Visible Body" and "Complete Anatomy" anatomy apps. If teachers have access to a skeleton, Miller suggests modeling muscle movement using an exercise band on the skeleton.

[30] For introductory anatomy scripts for students, see Thompson-Robinow, 20–25.

3.1.2.2. Incorporating Biomechanical Explanations of Alignment

When focusing on finding good alignment, it is even more important to consider the alignment contextually. Sometimes it is impossible to have good alignment, or you can momentarily move out of good alignment.[31] This constant flux and readjustment is known as **dynamic alignment** in the Franklin Method, and is defined as alignment respecting the "rules of biomechanical efficiency."[32] Violinists should consider teaching principles of dynamic alignment because teaching or envisioning posture in a "frozen" position (also known as static positioning) rarely improves movement skills and can often be detrimental to the performer for two reasons.[33] First, non-moving positions may look good but do not provide information to the body and brain about how to move more efficiently. Second, instructions for achieving these postures, such as "zip up your abdominal muscles" or "lengthen your spine," can increase tension and gripping in muscles even though they achieve a desired aesthetic result. Muscles already contracted to hold a position cannot efficiently contract to initiate movements, further resulting in less powerful movements.[34]

Posture should be taught by focusing on movement rather than by consciously activating specific muscles because not everyone initiates movement or achieves their alignment using the same set of muscles or identical timing. The benefits of a dynamic approach to alignment, Eric Franklin argues, include more balanced muscle tone and increased muscular strength and flexibility through movement, reduced chances of injury through "better biomechanical transfer

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[31] "Where Do We Start In Learning About Musicians' Health?"

[32] Franklin, *Dynamic Alignment*, xi.

[33] Ibid., 13.

[34] Ibid., 1.

of forces through the joints and body systems," effective ways to rest and recuperate after an activity, better coordination and observational skills, and easier comprehension and performance of movement sequences.[35]

Learning biomechanical information about specific joints or muscles can also help improve overall movement efficiency.[36] "The traditional approach to teaching alignment," Franklin explains, "is to focus on bony landmarks and their relationship to each other… While this idea is helpful, it does not reflect the nature of human movement, because these landmarks move relative to each other…"[37] One way to learn and conceptualize biomechanical information is to study **bone rhythms**, which Franklin defines as "the natural and safe way bones move" in counter-rotation to each other.[38] Bone rhythms help visually comprehend how bones and joints "relate to each other three dimensionally to create optimal efficiency of movement."[39] Violinists may be familiar with the concept of *humeroscapular rhythm*, where the scapula "follows sequentially behind the humerus" during upper arm movements.[40] (Body Mapping experts

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[35] Ibid., 2.

[36] Ibid., 14.

[37] Eric Franklin and Alison Wesley, "Pelvic Anatomy and Function – Bone Rhythms," Human Kinetics, accessed March 16, 2021, https://us.humankinetics.com/blogs/excerpt/pelvic-anatomy-and-function-bone-rhythms.

[38] Ibid.

[39] Franklin, *Dynamic Alignment*, 25.
The counter-rotation of bones also improves efficiency in terms of force absorption and force generation. Franklin explains that when you jump and land on your feet, the leg bones counter-rotate to distribute the force absorbed while landing. See Eric Franklin and Alison Wesley, "Pelvic Anatomy and Function – Bone Rhythms," Human Kinetics, accessed March 16, 2021, https://us.humankinetics.com/blogs/excerpt/pelvic-anatomy-and-function-bone-rhythms.

[40] Johnson, 95.

identify humeroscapular rhythm as an essential component of healthy violin technique.[41]) Bone rhythms describe even more subtle and complex movement. For example, when the arm is abducted, or lifted to the side, the head of the upper arm bone (the humerus) slides down slightly as it rolls upward in the shoulder joint at a place called the glenoid fossa so that it does not run into the acromium, the edge of the shoulder blade where it meets the collarbone. Simultaneously, the arm instinctively rotates externally to prevent the head of the humerus from impinging on the acromium. This means your arm experiences a subtle outward rotation when you lift it straight from your side, a kinesiological phenomenon known as the Codman paradox. However, if you try to keep the arm in the same position (preventing the external rotation of the arm) or try to internally rotate the arm while lifting, the shoulder girdle lifts up as well. In contrast, the external rotation makes lifting the arm more efficient.[42] This provides one biomechanical justification for why violin pedagogues encourage students to not lift their shoulders while playing.

Bone rhythms are a relatively new tool in somatic understandings of the body, using biomechanical imagery to explain complex kinesiological concepts. (For more on biomechanical imagery, see Chapter Six). They also challenge conventional anatomical opinions. For example, Johnson addresses a common mis-mapping regarding the bones involved in forearm rotation where violinists believe the ulna causes the arm to rotate from palm-up to palm-down instead of the radius. She states that "the ulna cannot budge in a rotational movement inside its notch because the humerus does not allow it."[43] While this is an important mis-mapping to correct, Johnson's statement is biomechanically inaccurate. If you stretch your arm forward as if to carry

[41] Ibid., 96.

[42] Franklin, *Dynamic Alignment*, 314.

[43] Johnson, 101.

a tray (causing the arm to straighten), the "humerus rotates slightly to the medial side and the ulna will abduct and rotate externally… As you pull your arm back towards your body, the humerus rotates externally while the ulna abducts and rotates internally."[44] Awareness of these small counter-rotations of the humerus and ulna as the arm bends and straightens at the elbow can help make bowing movements more efficient by reducing muscle compensation, and therefore tension.[45]

3.1.2.3. Incorporating Information about Human Movement Hierarchies

One approach for studying and organizing knowledge of violin-playing for QMD is to "compare the movements [involved] to those of similar activities."[46] Violin pedagogues often recommend this approach for teaching arm movements involved in bowing. For example, Gwen Thompson-Robinow encourages students to notice how their arm moves while doing everyday activities like throwing and bouncing a ball, picking up keys and books, opening doors, and holding objects.[47] She also endorses an arm-swinging exercise targeting shoulder mobility and creating a feeling of the arms being suspended from the collarbones. This exercise, where the arms swing back and forth before swinging up and landing on the opposite shoulder, involves upper arm movements similar to bringing the bow to the violin.[48]

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[44] Franklin, *Dynamic Alignment*, 324.

[45] For more information on bone rhythms, Franklin provides detailed descriptions and imagery exercises to conceptualize them in *Dynamic Alignment Through Imagery*.

[46] Knudson, 80.

[47] Thompson-Robinow, 40–41.

[48] Ibid., 30-31.

Kinesiology experts recommend basing these comparisons on **fundamental movement patterns**, which are "broad categories of movements for a general purpose... [and] can be adapted for specific purposes or combined with other fundamental movement patterns to complete a specific task."[49] Common examples of fundamental movement patterns include jumping, walking, and stretching the arm forward. Knudson explains that they "can be adapted for specific purposes or combined with other fundamental movement patterns to complete a specific task."[50] Violinists use different fundamental movement patterns simultaneously in their right and left arms while playing. For example, during shifting, the left arm extends forward while bending at the elbow to move up the fingerboard. The right arm independently moves in a completely separate set of fundamental movement patterns while bowing. It may extend forward, experience forearm pronation and supination, and rotate in different directions at the shoulder joint.

Some kinesiologists break fundamental movement patterns down into smaller groups. **Motor skills** are "adapted fundamental movement [patterns] for a specific activity or goal."[51] Examples in violin-playing include bowing, left-hand fingering and hand frame positions, shifting, string-crossing movements, and basic vibrato movements. **Techniques** are "skills with even more specific purposes. The selection of appropriate technique varies with each situation."[52] Examples in violin-playing might include specific bow strokes, classical and romantic shifts, different vibrato widths, and different double-stops. **Styles** are personalized

[49] Knudson, 80.

[50] Ibid., 80.

[51] Ibid., 80.

[52] Ibid., 80.

variations of a technique with aspects including "personal differences, rhythms, idiosyncrasies, or actions related to a specific performer."[53] These include interpretative decisions specific to the repertoire, style, and genre, various technical approaches drawing from different schools of thought, and performer-specific differences. However, it is challenging to evaluate at the stylistic level because "the professional must decide whether minor variations in the movement detract from performance."[54]

Pedagogues praise Ivan Galamian for first drawing attention to what he calls the physical motions involved in violin-playing in *Principles of Violin Playing and Teaching* (1962).[55] Table 3 summarizes how Galamian divides the physical motions of the right arm into specific movements of the fingers, hand, forearm, and upper arm. While Galamian's analysis is commendable for the time in which it was written, his descriptions of these adapted fundamental movement patterns are anatomically vague compared to modern understanding of anatomy and biomechanics. For example, forearm rotation involves two bones: the radius and the ulna. Without this anatomical detail, Galamian's description of forearm rotation may lead to mis-mapping, tension, and even pain while bowing. Galamian's descriptions of upper arm motions are even more anatomically confusing. He describes the vertical motion as the elbow moving away from and back towards the body. Does he mean arm extension and flexion? The elbow moving away from the body implies abduction from the side. His description of the horizontal motion of the arm as the upper arm moving towards the middle of the body and back to the side requires the arm to abduct at the shoulder and roll in the shoulder joint in towards the middle of

[53] Ibid., 80.

[54] Ibid., 80.

[55] Swartz, 23.

Table 3. Galamian's Right-Arm Movement Patterns

Fingers	**Movement**	**Bow Function**
Vertical Motion	Fingers and thumb move the bow up and down.	Sets the bow and lifts it off the string.
Horizontal Motion	Fingers and thumb move the bow lengthwise.	Makes small bow movements without the hand and arm involved. Helps rebalance the hand at the frog and tip before changing bow direction.
Horizontal Turning (Pivoting)	Index and pinky fingers alternate pushing and pulling the bow.	Changes the bow angle on the string.
Vertical Turning (Pivoting)	Push down and release with the pinky.	Helps control bow pressure and assists in string crossings at the frog.
Length-wise Axis Rotation	Fingers and thumb roll the bow between them.	Changes the amount of bow hair contacting the string.
Hand at the Wrist	**Movement**	**Bow Function**
Vertical Motion	Hand moves up and down at the wrist from a neutral position in line with the forearm.	Helps move the bow to and from the tip and frog. Combines with horizontal motions to allow circular motions.
Horizontal Motion	Hand moves laterally from a neutral position in line with the forearm.	Facilitates different bow strokes. Combines with vertical motions to allow circular motions.
Forearm	**Movement**	**Bow Function**
Open-close Motion	Forearm bends and straightens at the elbow.	Facilitates most bow strokes. (Galamian calls the most important movement.)
Forearm Rotation	Forearm rotates in the elbow joint so the palm turns downward (pronation) and upward (supination).	Allows the bow to move from frog to tip. Assists with string crossings.
Upper Arm	**Movement**	**Bow Function**
Vertical Motion	The elbow moves away from and back towards the body.	Assists with string crossings.
Horizontal Motion	The upper arm moves towards the middle of the body and back.	Moves the bow between the frog and the middle.

Source: adapted from Ivan Galamian, *Principles of Violin Playing and Teaching*, Mineola, NY: Dover, 2013, 48–51.

the body, two different fundamental movement patterns. These inconsistencies suggest Galamian might have had an incomplete understanding of functional movement patterns or confused his terminology (either due to lack of information or the scientific research available at the time).

Violin pedagogy tends to overlook certain functional movement patterns involved in motor skills and techniques. For instance, many treatises move directly from teaching the bow hold to discussing bow mechanics with the bow already placed on the string without considering the movement of the arm in between. To bring the bow to the string, the student must pronate their forearm (during which the radius rolls up and over the ulna), bend the elbow (the ulna counter-rotates with the humerus), and raise the arm while abducting it from the side of the

body—at least three different fundamental motions happen that could affect overall comfort and ease. Thinking about all of these movements while setting the bow on the string would likely cause tension in any player, which is a reason teachers use substitute movements like reaching for a book or manual guidance to teach students how to move their arms for playing. However, it is important to not assume that students naturally have healthy functional movement or that manual guidance on the teacher's part ensures future healthy movement. Teachers can assess students' functional movement patterns if the student is experiencing pain, going through a remedial process, or dealing with other playing inhibitors.

3.1.3. Critical Features and Common Errors

One of the most important kinds of knowledge of activity is that of **critical features**. Critical features describe the most important elements of posture, fundamental movement patterns, motor skills, techniques, and styles specific to violin-playing, and that are necessary for successful execution of a movement or technique. They are the "aspects of movement that are the most invariant across performers and are the least adaptable if the goal of the movement is to be achieved safely and efficiently."[56] Critical features play a key part in teaching and evaluating technique in the violin lesson:

1. **Teachers use critical features to teach form.**[57] To hold the violin, Paul Rolland teaches beginning students to place their left hands near, or touching, the fingerboard with the base of the index finger.[58] When practicing bringing the violin up onto the shoulder, he instructs teachers to look for the placement of the button at the base of the violin near or

[56] Knudson, 81.

[57] Ibid., 81.

[58] Rolland, 64.

at the center of the throat.[59] The locations of the index finger and the button are critical features Rolland identifies as necessary for good form. There are many more critical features of posture, alignment, and the basic violin position. Some may be specific to the violin, and others may be general anatomical principles, such as the alignment of the head at the atlanto-occipital joint and other places of balance identified in Body Mapping.[60]

2. **Critical features are crucial to the successful performance of a movement or technique.**[61] The first pieces Mimi Zweig introduces to beginning students train the left hand position and teach the left elbow "to move from left to right under the violin as needed for string changes."[62] The basic shape of the left hand and the free movement of the upper arm at the shoulder, allowing the elbow to move in an arc under the violin, are critical features necessary for all left-hand techniques. For a more specific technique like *spiccato*, Simon Fischer identifies two primary critical features (the height of the bounce and the length of the stroke) and three additional features influencing them (placement relative to the bridge, tempi, and location in the bow).[63]
3. **Critical features determine the focus of QMD.** Knudson states that an "integrated QMD often uses critical features as the standards for observing, assessing, and improving

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[59] Ibid., 70.

[60] Johnson, 41.

[61] Knudson, 81.

[62] Mimi Zweig, "Part 3: First Pieces (using left hand pizzicato)," String Pedagogy.com, accessed March 18, 2021, http://www.stringpedagogy.com/members/?submissionGuid=b12d81f4-327e-4037-ab36-a4fadf182892.

[63] Fischer, *The Violin Lesson*, 284.

movement."[64] During the observation and diagnostic evaluation stages of QMD, the teacher looks for critical features to determine what may contribute to a movement or technical issue. (See Chapter Four.) Some of these critical features may be **common errors** that have been well documented as threatening the success or safety of a movement or technique.

4. **Critical features can apply to any level of qualitative assessment (fundamental movement pattern, motor skill, technique, and style).**[65] The critical features identified above by Rolland and Zweig can be considered critical features at the motor skill level (adapted fundamental movement patterns for violin), whereas Fischer's critical features for *spiccato* can be classified as critical features at the technique level. Stylistic critical features in a work by Mozart, for example, might include narrow or no vibrato, "classical" shifts, and light, brushed bow strokes on eighth notes. Violin teachers introduce concepts and evaluate performances using critical features at all four levels. If students experience difficulty with a specific technique or feel pain, teachers can look for critical features to determine if the student needs help with a style, technique, motor skill, or fundamental movement pattern.

Fischer may not use the same terminology as kinesiologists, but his theory of **proportions** is akin to critical features. He believes "the entire physical side of playing—the concrete reality of the hands and fingers, the bow and the string, and how they work—is completely describable (and therefore teachable)" in terms of proportions.[66] For instance, bowing uses different

[64] Knudson, 80–81.

[65] Ibid., 80.

[66] Fischer, *The Violin Lesson*, 96.

proportions of speed, pressure, and contact point. Vibrato uses different proportions of speed and width. The rules of violin technique are therefore the natural result of experimenting with proportions. For example, violinists leave their thumb on the tab of the violin when shifting and playing in high positions above the bout. Fischer explains,

> The degree of freedom of the left hand, or the degree of it feeling immovable, is in direct proportion to the degree of its pressing on the upper rim of the left shoulder of the violin. When the hand is entirely clear of the rim, pivoting or resting only on the thumb, it is naturally much freer or more mobile than when it presses hard on the rim and becomes immovable.[67]

Violinists can consider critical features and proportions as two pieces of the same puzzle. Some critical features, like the placement of the thumb at the bout in high positions, result from experiments with proportions. Other critical features derive from biomechanical principles of functional anatomy, effective movement, and alignment, and therefore define the scope of these experiments.

Critical features relate either to the movement itself or to the outcome of the movement.[68] For violinists, critical features relating to the outcome of the movement largely involve sound—the aural result of a specific movement or technique. These might include intonation, articulation, resonance, sound production, tone, and expressive elements like phrasing. If a double-stopped note is out of tune, it signifies that violinists must examine critical features of the movement such as hand position, elbow level, spacing between fingers, the position along the fingerboard, and places of tension in the body.

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[67] Ibid., 98.

[68] Knudson, 85.
This corresponds to feedback relating either to knowledge of performance or knowledge of results in motor learning, discussed in Chapter Five.

Critical features can be expressed as behavioral terms that are analyzed visually (or aurally, as just discussed) or as abstract constructs that are more difficult to define biomechanically.[69] The placement of the base of the index finger along the neck and fingerboard, the length of a bow stroke, and the alignment of the head on top of the spine are all examples of visually perceived behaviors. In contrast, many kinesthetic concepts (how we move and use our bodies) are more abstract. These include somatic concepts like bone rhythms and Body Mapping, which help describe internally imaged critical features, and key pedagogical concepts for violin like arm-weight. Arm-weight—which describes the transfer of weight from the upper-arm through the forearm, hand, fingers, top of the bow, bow-hair, and finally into the string and is an important critical feature for bowing—can be difficult to explain to students.[70] Swartz explains that one of the traditional cues for using arm-weight, "relax your arm," can cause students to drop their elbow in a way that negatively affects the tone. Instead, he argues that students should "find a way to use the 'limp arm' in a manner that is not limp. This requires a support system in the bow-arm that transfers the weight from the upper-arm to the bow."[71] To help students understand this abstract concept, Swartz uses metaphors and teacher-assisted exercises to kinesthetically experience the weight transferring through the arm.[72]

3.1.3.1. Finding Critical Features

To determine critical features, violin instructors can draw on their knowledge of violin technique, anatomy, alignment, and movement hierarchies learned from experience, expert

[69] Ibid., 81–82.

[70] Swartz, 33.

[71] Ibid., 34–35.

[72] See Swartz, 35–37 and 40–41.

knowledge, and biomechanical research. The primary places for teachers to identify critical features are in violin treatises and other pedagogical materials. Although Fischer and Thompson-Robinow include some lists of highlighted critical features in their texts, critical features are often embedded in paragraphs of prose. For example, Galamian describes the three stages of a straight bow:

> There are three distinct stages of the whole-bow stroke. (1) When the bow is set on the strings at the very frog, a triangle is formed by the arm and instrument… (2) When the bow is set on the string at approximately the middle (the exact place varies with the individual player) a square is formed… Notice that this right angle in the elbow will form *somewhere* in every bow arm. By straightening up this square (which with some players becomes more of an elongated rectangle) the player will find that his shoulder will tend to relax, his arm to hang naturally from the shoulder, and his wrist to become almost level with his arm and hand. (3) When the bow is set on the strings at the tip, the right arm is then stretched out nearly straight, the elbow's right angle now becoming almost a straight angle—[73]

Galamian helpfully numbers the three stages which correspond to three critical features of a straight bow stroke: the bow-arm forming a triangle at the frog, a square or rectangle in the "middle" of the bow, and stretching out at the tip. Other critical features embedded in this passage include the wrist being approximately level with the arm and hand at the square position and either the appearance of tension or relaxation in the square position depending on the angle of the bow and the square. Swartz finds a similarly hidden key critical feature for shifting in one of Galamian's footnotes, noting that "Galamian has identified the elbow as a gauge to determine the distance of the shift. The elbow is opened to angles that correspond to different positions on the violin; concentrating on the elbow-angle, therefore, will help with shifting accuracy and consistency."[74]

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[73] Galamian, 52.

[74] Swartz, 27.
To read the original footnote, see Galamian, 20.

Violinists can be on the lookout for critical features when reading treatises. Identifying a critical feature as part of a motor skill, technique, or style can function as a strategy for grasping these often-dense texts. However, treatises of the past rarely include in-depth anatomical and biomechanical information necessary for critical features of functional movement patterns. There is a general consensus today that teachers need to develop an understanding of functional anatomy to accurately find critical features of posture and alignment. Biomechanics also provides sources for critical features drawing from kinematic information (including range of motion, body angles, and length) and kinetic information (the forces used to move).[75] Violinists can study a somatic method like Alexander Technique, Feldenkrais, Body Mapping, or the Franklin Method and incorporate abstract kinesthetic concepts into their understanding of the critical features of fundamental movements. They also can draw from recent biomechanical research concerning musicians.[76]

3.1.3.2. Safety, Effectiveness, and Efficiency

Knudson states that critical features should be based on the "safety, effectiveness, and efficiency of the movement."[77]

A. Safety

Teachers must ensure students execute the technique or movement safely. Factors influencing safety include the student's age, level of fitness, experience with injuries, and mental

[75] Knudson, 82.

[76] Hiew includes extensive summaries of bow-string interactions, left-hand and right-hand movement studies, and their pedagogical implications in "Towards a Pedagogical Reference Work for Violinists Informed by Current Music Psychology Research."

[77] Knudson, 83.

and physical exhaustion.[78] Biomechanical research provides insights into common postural concerns and factors leading to pain in the shoulders, arms, and hands. The asymmetrical nature of violin-playing makes back problems and other postural issues unavoidable. Critical features indicating the typical pattern of misuse include a hunched left shoulder and the chin pressed down to the left. This results in shoulder muscle fatigue, spinal rotation, and lateral spinal flexion. The upper back rotates to the right as the left shoulder rotates forward, while the neck, and therefore the cervical spine, tilts left. Over time, the muscles of the left side of the trunk become stronger than those on the right.[79] Researchers also hypothesize that thoracic spine (upper back) pain is associated with both the positioning of the instrument on the shoulder and the physical size of the body.[80]

String players continually use shoulder muscles to rotate the points of the shoulders up and lift both arms into position.[81] In their anthropometric study of physical characteristics and pain, Ackermann and Adams suggest that left arm pain may be due to a static violin hold or "overall increased muscle tension in the arms or specific movement patterns rather than from a strain type of effort."[82] Studying shoulder impingement in college-age violinists and violists, Moore et al. conclude that student musicians may be more at risk for shoulder impingement than

[78] Ibid., 82.

[79] Watson, 34.

[80] Bronwen Ackermann, and Roger Adams, "Physical Characteristics and Pain Patterns of Skilled Violinists," *Medical Problems of Performing Artists* 18, no. 2 (June 2003): 68–69. Ackermann and Adams find that lower back pain can be predicted by measuring a critical feature like the length of the front of the neck, theorizing that shorter necks cannot apply head weight as easily and rely on compensatory postures in the lower back to lift the chest up to support the violin.

[81] Watson., 44.

[82] Ackermann and Adams, "Physical Characteristics," 70.

professionals because they tend to be less relaxed and use larger muscle groups, whereas professionals rely on the smaller rotator cuff muscles. However, they find "no significant difference in playing time or number of rest breaks among string musicians with and without shoulder impingement."[83]

Teachers may also observe critical features that indicate an issue with the student's chin rest and shoulder supports (referred to collectively as "setup" by violinists). An ergonomically appropriate setup is an important factor for movement safety, but setup remains a controversial subject in violin pedagogy, as "teachers who advocate using only a thin sponge or cloth insist that manufactured shoulder rests are too big, clunky, and rigid, and encourage a rigid response from the body… [Others] believe that playing with a shoulder rest is just fine because they have used one their whole lives and have never encountered any problems."[84] Research studies show that using a shoulder rest affects muscle activity.[85] Specifically, electromyography studies find that shoulder rests reduce trapezius and sternocleidomastoid muscle activity (which, respectively, raise the shoulder and rotate and tilt the head left) and increase activity in the anterior head of the deltoid (which raises and rotates the arm outward to hold the violin).[86] But violinists may develop tension problems playing with a hard shoulder rest because it often incorrectly rests on muscle and immobilizes the shoulder.[87] Biomechanical experts like Alan Watson suggest that

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[83] M. Moore et al., "Clinical Assessment of Shoulder Impingement Factors in Violin and Viola Players," *Medical Problems of Performing Artists* 23, no. 4 (Dec. 2008): 160. https://www.sciandmed.com/mppa/journalviewer.aspx?issue=1178&article=1764.

[84] Johnson, 157.

[85] Chi et al., 13.

[86] Watson, 35.

[87] Johnson, 157.

violinists prioritize finding a well-fitting chin rest, as it is more important for determining the force needed to hold the instrument on the shoulder and for facilitating bowing. Regular ergonomic assessments are also necessary when working with young students as they grow.[88] (See Equipment Modifications.)

B. Effectiveness

Every movement has a specific purpose. Knudson explains that "principles of biomechanics can be used to evaluate whether a particular movement pattern or form is optimally effective in achieving a particular outcome."[89] Violinists usually judge effectiveness by aural critical features like tone, pitch and rhythmic accuracy, intonation, and articulation. If any of these elements are inaccurate, there is an issue with at least one movement or critical feature involved. For example, the movement of the left elbow left and right in space allows the violinist to keep their hand centered on each string and therefore play more in tune. If a student plays out of tune after moving from a higher string to the next lower string, they may have not moved their elbow to the new string level. Using the hand to reach to a lower string without the accompanying elbow movement decreases stability, increases tension, and prevents the fingers from reaching the correct pitches. Teachers can draw students' attention to specific movements and critical features to develop an awareness of their body and why they want to move in certain ways. To reveal ineffective or uncomfortable postures, Fischer recommends instructing students to freeze like a statue, take away their instrument, and have them hold the pose for 10-20 seconds.[90]

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[88] Watson, 35–36.

[89] Knudson, 82–83.

[90] Fischer, *The Violin Lesson*, 204.

Some violinists prefer to stand relatively still; others prefer to sway and rotate while playing. Neither is "incorrect"; rather, as Fischer states, the goal is to maintain a "freedom of balance and flow."[91] Galamian cautions teachers to "be broad-minded enough not to classify as bad habits everything that does not conform exactly to his own personal way of playing."[92] Similarly, students may adapt their technique to their physique. For instance, students with flat fingertips may not be able to place their fingers on the tip and maintain contact with the string.[93] Fischer also points out that something contrary to pedagogical practice may achieve feelings of balance and ease. He explains,

> When there is something 'wrong' in the way you hold the violin and bow, or in your technique, there must be some definite perception of an advantage to yourself in doing whatever it is, because otherwise you simply would not do it... If you place the violin too low on the shoulder at the top of the chest, it is natural and 'correct' to fold in with your shoulders; if you press the fingers too hard into the strings, like playing a guitar, you are 'right' to counterpress with the thumb…[94]

Understanding the perceived benefits of these movements/postures, such as a psychological or physiological feeling of stability, helps violinists identify possible interventions. Teachers can then explain to the student why the movement/posture is less effective or unhealthy and show the benefits of an alternative approach using specific critical features.[95]

C. Efficiency

Essentially, Fischer describes the concept of dynamic alignment.

[91] Ibid., 196.

[92] Galamian, 105.

[93] Fischer, *The Violin Lesson*, 198.

[94] Ibid., 196–197.

[95] Ibid., 197.

In Fischer's opinion, the "key to absolute mastery of the violin is in not allowing unwanted extra physical movements to occur as a knock-on effect, or by-product, of the actions that are absolutely necessary."[96] He describes this as "localizing" a movement. For example, when placing a finger on the string, only the muscles involved in the finger dropping should activate. Extra muscular activity, such as the wrist being pushed back, the thumb squeezing, the head pushing down on the chin rest, and pressing with the bow, should be avoided. This requires body awareness and mental control by the performer. Fischer draws from Alexander Technique, using the concepts of Inhibition and Direction to notice an unnecessary muscle response, stop, decide to do something else, and continue this pattern until a new habit forms.[97]

For the teacher, it can be difficult to observe and evaluate the efficiency of minor variations in technique. Some movements are more easily identifiable as wasting energy (such as fingers pressing down with excessive force or the thumbs counter-pressing) than others (such as the pectoral muscles contracting excessively while bowing or holding the violin).[98] In the observation stage, it is beneficial for the student to share their kinesthetic experiences. Teachers can use this feedback to help evaluate and diagnose inefficiencies and incorporate critical features improving efficiency into instruction. For instance, one way to transfer arm-weight when changing bow direction is by pronating and supinating the forearm. Swartz explains that "pronating the forearm puts more emphasis on the index finger; many violinists do this as the bow approaches its tip in order to compensate for its lightness. While this motion provides a

[96] Ibid., 198.

[97] Ibid., 198–200.

[98] Knudson, 83.

feeling of strength, it mainly creates leverage that results in pushing onto the string."[99] Instead of increasing pressure, which can negatively affect the sound and affect arm tension, Swartz recommends teaching students how to transfer arm-weight through the fingers. Critical features in this instance would be the transfer of weight from the index finger ultimately into the third and fourth fingers and those knuckles bending by the time the bow reaches the frog.[100]

D. Range of Correctiveness

While critical features should be defined as exactly as possible, many critical features need a **range of correctiveness** based on different physiological characteristics, preferences, and types of movement. However, conflicting expert opinions and research and biomechanical theories makes establishing a range of correctiveness more difficult.[101] For example, while shifting, Galamian warns against shortening the note before the shift and disrupting the rhythmic evenness of the sound. He attributes this to psychological anxiety over losing control of the shift.[102] However, Fischer believes violinists must steal time from the note before the shift in order to land on the new note with precise rhythm.[103] As such, teachers must establish a range of correctness for timing shifts.

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[99] Swartz, 44.

[100] Ibid., 42–44.
Swartz warns this may require students to develop the muscles on the ulna side of the arm. For an exercise addressing this, see Swartz, 43–44.

[101] Knudson, 84–85.

[102] Galamian, 26–27.

[103] Fischer, 243.
Fischer assumes Galamian made a linguistic mistake and actually meant that the violinist "must not *sound* as though the note before the shift has been shortened."

Ackermann and Adams acknowledge difficulties implementing recommendations from sports literature, such as guidelines for optimal postures, because of a wide range of individual preferences among violinists and schools of playing.[104] Lee confirms this in "A Physiological Approach to Posture as a Basis for Violin Technique" by presenting many examples of contradictory instructions for elements of technique such as violin angle, tilt, hold, and placement in pedagogical treatises by Baillot, Spohr, Auer, Flesch, and Galamian and photos, descriptions, and commentary from famous performers like Paganini, Thibaud, Elman, Heifetz, Oistrakh, Stern, and Perlman. In each of the seven areas of posture (angle, fingerboard slope, tilt, placement, hold, chin rests and shoulder supports, and stance), Lee finds multiple contradictory perspectives. For instance, the recommended angle of the violin ranges from straight to the side (violist and medical doctor Robert Dew advocates for this in order to free the left shoulder joint) to straight in front of the chest (as promoted by Baillot). In contrast, Flesch suggests a moderate angle based on bow trajectory. Lee also references a German case study where a violinist healed from a four-month injury by retraining his arm motions and changing the angle of the violin, 30 degrees farther to the side than the average violinist, suggesting that Flesch and Baillot's methods might more successfully prevent discomfort.[105]

Defining the range of correctiveness for some critical features is further complicated by the fact that biomechanical research has not yet identified optimal movement patterns.[106] Watson admits that many biomechanical research studies on bowing are limited to collecting data and struggle to offer practical recommendations for future implementation in applied performance

[104] Ackermann and Adams, "Perceptions of Causes of Performance-related Injuries by Music Health Experts and Injured Violinists," 674–675.

[105] Lee, 19–21.

[106] Knudson, 85.

and teaching.[107] Future research studies could investigate individual critical features such as "the angle or [biomechanical] loading of a particular joint" in order to provide practical recommendations for string players.[108]

When assembling a knowledge base of critical features, violinists can weigh their experience, expert opinions, and current biomechanical understanding of movement and anatomy. Figure 2 offers some guiding questions for self-reflection. Alternatively, music pedagogues Cornelia Watkins and Laurie Scott provide self-reflection tables for analyzing the optimal physical components of technique, sound production, and movement, problems that arise from technical issues, and fundamental teaching methods for each component in *From the Stage to the Studio*.[109] Scholars and experts can create universal taxonomies of critical features for skills, fundamental movement patterns, common technical errors, and lists of cue words and phrases corresponding to critical features.[110] While no such universal taxonomies currently exist for violinists, Fischer includes various lists of technical problems (common errors) and technical areas to check, areas to release tension, chain reactions of tension and key areas to find balance (critical features) in *The Violin Lesson*.[111] (For more on identifying cues in violin treatises, see Chapter 6.)

[107] Watson, 87–88.

[108] Ibid., 87–88.

[109] Watkins, Cornelia and Laurie Scott. *From Stage to the Studio: How Fine Musicians Become Great Teachers (*New York: Oxford University Press, 2012), chap. 3, Kindle.

[110] Knudson, 86.

[111] See Fischer, xvi, xx, 75, 98-99, 102, 164–165, 192.

3.1.4. Motor Development Sequences and Key Milestones

Besides preparing a knowledge base of critical features and common errors, violinists must gain an understanding of motor development sequences for appropriate ages and stages of learning. It is important to know what to look for in the early stages of motor learning, although Knudson admits that "many adults do not reach the mature level of many fundamental movement patterns."[112] Fortunately, many motor development sequences for the beginning stages of violin technique are built into pedagogical materials by Zweig, Rolland, Edmund Sprunger, and Rebecca Henry.[113] Because many students begin lessons between 3-5 years old, these materials consider children's motor skill development. For example, Sprunger instructs parents and students to practice rubbing their right hand on their left arm using the "Mississippi Hot Dog" rhythm to introduce forearm motions involved in bowing and form a bow hold first on a pen or pencil.[114] Zweig uses various "bow hold games" like placing the frog on the nose (Pinocchio) or head (Unicorn) or blasting off the floor like a rocket (Space Shuttle) to help children develop endurance holding the bow while moving. She also suggests placing a cardboard tube on the student's shoulder and having them practice bowing the "Twinkle" rhythms from *Suzuki Violin School*, Volume One before bowing with the violin.[115]

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[112] Knudson, 85.

[113] Henry's website, ViolinPractice Method, offers supplemental sequential pedagogical and practice materials for beginning violinists based on the work of Zweig, Rolland, Suzuki, and Galamian. See "About Violin Practice Method," Violin Practice Method, accessed March 21, 2021, https://www.violinpractice.com.

[114] Edmund Sprunger, *Building Violin Skills: A Set of Plans Designed to Help Parents and Children Construct Positive Practices* (St. Louis: Yes Publishing, 2012), 105.

[115] Mimi Zweig, "Part 4: The Bow," Mimi Zweig String Pedagogy, accessed March 21, 2021, http://www.stringpedagogy.com/members/?submissionGuid=6e86c182-dcb5-457f-b11d-448a3bd52639.

Figure 2. Sourcing and Analyzing Critical Features

Other important sequences include knowledge of motor learning, practice schedules, and stages of learning new movement.[116]

Motor learning: motor learning is discussed in this document as a component of Feedback and Practice interventions. Helding's *The Musician's Mind* provides an excellent overview of motor learning for applied musical instruction.

Practice schedules: Violin teachers typically dictate what students should practice and for how long. With young students, the primary goal for practicing is teaching them how to practice. Sprunger gives parents their own practice assignments and requests they practice around their children to demonstrate good practicing habits.[117] He encourages young families to start with 1 minute per day for six days each week to build familiarity and consistency.[118] There are many resources available for practicing with different target audiences. Sprunger's *Building Violin Skills* addresses practicing in the first years of playing with young children. Burton Kaplan's *Practicing for Artistic Success* and Madeline Bruser's *The Art of Practicing* offer structured and holistic methods for intermediate and advanced performers. Harald Jorgensen's "Strategies for Individual Practice" in *Musical Excellence* introduces metastrategies for the teacher and advanced performers. (For more, see Practice Metastrategies Interventions.) For injured or vacationing players returning to playing after a lengthy absence, Horvath and Weilerstein and Neal offer outline sample practice routines to return to playing safely.[119]

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[116] Knudson, 76–77.

[117] Sprunger, 43.

[118] Ibid., 26.

[119] See Horvath, 151–152 and Weilerstein and Neal, 574.

Stages of learning new movement: pedagogical works by Swartz, Fischer, Rolland, Zweig, and Thompson-Robinow provide clear, step-by-step instructions for learning specific right and left-arm techniques with exercises for further practice. With younger students, Sprunger encourages teachers to communicate with parents that moving at a "glacial pace" is crucial for children to continually experience success learning new motor skills. For some students, the beginning stages may take 9-12 months, while for other students, it might take 3 years.[120] Clear sequential instruction is necessary for parents as well because "when parents aren't sure what needs to happen with the step-by-step sequence of physical skills, they start focusing on the notes to the pieces, which deludes them into thinking they're 'doing something.'"[121] Two essential components of teaching and practicing are developing skills and increasing awareness. For instance, only when a student understands how to move their fingers freely will Sprunger draw their attention to the concept of playing in tune.[122] New teachers may struggle with overeager parents who wish to push their children ahead and introduce more advanced concepts at home. Teachers can emphasize that adding in extra technical content before children have mastered their current skills may cause feelings of overwhelm.[123] However, teachers can break down instructional sequences into small enough steps that students can successfully do on their own to help develop independence and confidence.[124]

Part II: Knowledge of the Performer

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[120] Sprunger, 90.

[121] Ibid., 110.

[122] Ibid., 36.

[123] Ibid., 71.

[124] Ibid., 111.

Better QMD comes from knowing more information about the mental and physical abilities of the student. This information, Knudson explains, pertains to genetics, anthropometrics (body measurements), age, gender, experience, training, and skill-related fitness components, and helps determine rehabilitation decisions and aids, conditioning needs, and equipment modifications. Teachers can learn more about these factors by consulting professional literature, clinical records (if available), and professional organizations.[125] Relevant music professional organizations include the American String Teachers' Association (ASTA), Music Teachers National Association (MTNA), and the Performing Arts Medical Association (PAMA). The following sections consider important factors for addressing the individual needs of the student violinist, including age, physiology, experience, ability, vitality, and learning styles.

3.2.1. Age

Although some violinists, such as postsecondary teachers, teach students within one specific age group or ability level, many more violin instructors work with a variety of ages and abilities. Teachers should consider factors such as motor development, physiological concerns, and learning related to the student's age.

A. Adults

"Adult students, whether senior citizens or working professionals, routinely bring years of tension, poor posture, and inefficient technical habits into their beginning work at a musical instrument," McAllister observes.[126] Adult beginners are often anxious or embarrassed about their skill level and may need a stress-free, informal lesson environment focusing on

[125] Knudson, 86.

[126] McAllister, *Yoga in the Music Studio,* 293.

relaxation.[127] They may benefit from somatic techniques and practices like yoga and other somatic methods. However, Fischer disputes the idea that older players "build-up tension over the years," making it harder for them to relearn how to play with ease. Instead, he argues that older players habitually contract specific muscles, which can be overwritten with new habits through conscious awareness and work.[128]

B. Young Adults

Puberty can affect coordination and strength.[129] Teachers can show compassion for adolescent students going through intense periods of emotional and physical development. One option is using breath and body awareness through yoga to help students develop positive, accepting self-talk and learn to objectively evaluate strengths and weaknesses in their musical performances.[130] These techniques can also help students learn to manage the emotions and fears brought about by performance anxiety.[131] (See Yoga.)

C. Children

Kempter advocates teaching elementary and pre-school learners movement and body positions first because they need a simplified approach.[132] Integrated (whole-body) movement is essential for pre-school children's motor development. McAllister explains that "if children are forced to simply sit and use only small motor movements during the first music lessons, they

[127] Ibid., 293.

[128] Fischer, *The Violin Lesson*, 180.

[129] Knudson, 87.

[130] Leslie Sisterhen McAllister, *Yoga in the Music Studio* (New York: Oxford University Press, 2020), 140.

[131] Ibid., 144.

[132] Kempter, 5.

miss the opportunity to take advantage of whole-body learning that maximizes musical expression through rhythmic, harmonic, and melodic understanding."[133] She recommends that young students attend movement and movement classes like Dalcroze classes or children's yoga to develop coordination, a sense of rhythm, and listening skills.[134]

Many elementary-aged children may struggle with abstract, complex strategic feedback and instruction.[135] Children are "focused on controlling their bodies in their immediate environment.... [They] love skill mastery. They do not seek reasons, justifications or explanations the way other students do."[136] Younger children also perceive primarily through their tactile and kinesthetic senses. The most challenging way for them to process information is by listening, but teachers often spend most of the lesson teaching through verbal instruction.[137] Instead, teachers could create opportunities for children to move around and kinesthetically experience activities and concepts in the lesson.[138]

Children have less stamina and focus than adults, so correctly sized instruments are crucial for positive, healthy musical experiences.[139] Modified yoga positions can also help

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[133] McAllister, *Yoga in the Music Studio*, 94–96.

[134] Ibid., 95.

[135] Knudson, 87.

[136] Kempter, 5.

[137] Maria Calissendorff, "Understanding the learning style of pre-school children learning the violin," *Music Education Research* 8, no. 1 (March 2006): 83–84, https://doi.org/10.1080/14613800600570769.

[138] Ibid., 94.

[139] Kempter, 18.

children gain endurance and concentration.[140] Because "the pinky-side of the hand is slowest to develop and is the weakest," Kempter recommends waiting to teach students to play with their left pinky finger[141] Children's hands can be strengthened by incorporating dexterity exercises such as picking up objects and crumpling newspaper into the lesson.[142] Violin teachers often provide manual assistance in these early stages, as Kempter observes it is challenging "for teachers to see tension in the hands of young children, and for this reason, from the beginning, either my hand, or the hand of the parent should be on their left hands — especially when they are beginning to put fingers down."[143] Kempter, Rolland, and Zweig endorse the "early bow hold" (also known as the "beginner" or "baby" bow hold) for students under 5-6 years old, as placing the thumb under the frog works best with younger children's motor skills.[144] The early bow hold makes the bow feel lighter and helps students move with greater ease.[145] When students learn "O Come Little Children" in *Suzuki Violin School* Volume One, Zweig begins the transition to the "grown-up" bow position with the thumb placed between the frog and the wrapping.[146]

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[140] McAllister, *Yoga in the Music Studio*, 97.
McAllister provides scripts, advice, and visual guides for teaching appropriate yoga positions for children.

[141] Kempter, 45.

[142] Ibid., 45–46.

[143] Kempter, 83.

[144] Ibid., 82–83.

[145] Rolland, 82.

[146] Mimi Zweig, "Teacher's Guide to Suzuki Book One," StringPedagogy.com, accessed March 10, 2021, http://www.stringpedagogy.com/members/?submissionGuid=91efd079-45ea-4750-9993-5c0c32be626b.

Preschool children may often desire an adult model (either the teacher or parent/guardian) to observe and follow. Since parents often cannot demonstrate on the violin, children do not visually notice errors in home practice. Instead, parents primarily help develop children's aural skills by praising or correcting elements. Teachers can help parents by providing visual models for home practice such as lesson or demonstration videos that parents and students can view together.[147] Children also want playing to be "easy and fun." If they find practicing challenging, they get tired.[148] The time of day can also affects children's motivation, energy, and playing.[149]

3.2.2. Physiology

Galamian stresses that the "right" position and setup is "only what is natural for the particular student, for only what is natural is comfortable and efficient."[150] While his statement does not account for learned movement patterns that may be unhealthy or inefficient, it highlights the need to account for physiological attributes of the performer. Body type and arm length significantly affect pedagogical recommendations for setup and the placement of the violin.

Arm length influences the angle of the violin and its position on the shoulder, affecting the violinist's risk for injuries. Violinists with shorter arms are more at risk because the large range of motion required for bowing creates "stress on these spinal structures, particularly so with the added stress arising from needing more left cervical side flexion on the instrument. Pain in the thoracic region may be related to compensatory movement patterns in response to the

[147] Calissendorff, 93–94.

[148] Ibid., 88.

[149] Ibid., 91.

[150] Galamian, 1.

degree of stretch required in the right arm."[151] This supports Fischer's recommendations for short-armed violinists to angle the violin more towards the center of the body and place the violin higher on the shoulder so the chin is closer to, or above, the tailpiece. Long-armed violinists can angle the violin farther to the left of the body and place the violin lower on the shoulder, so the chin is more to the left of the tailpiece. Teachers can look at the student's right arm position to tell if the violin is placed appropriately. If the bow arm of a short-armed violinist is practically straight at the tip of the bow, the violin is likely placed too low on the shoulder. If a long-armed violinist's bow arm is in the square position while at the tip, the violin is likely placed too high.[152]

Ackermann and Adams also endorse Galamian's suggestion for children to use smaller bows as needed until they are fully grown.[153] Watching young students' bow arms when playing on the E string helps ensure that their arm moves to the E string level instead of staying suspended between the E and A string levels, which can cause shoulder-joint injuries later on as the student grows, their arms become heavier, and the shoulder gets locked in a forward position for long periods of time.[154]

Violinists with short necks may prefer playing without a shoulder rest because the violin sits flatter on the clavicle and is more resonant.[155] Violinists with long necks suffer more from trapezius muscle spasms, neck muscle strain, and pinched nerves, but raising a shoulder rest can

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[151] Ackermann and Adams, "Physical Characteristics," 68–69.

[152] Fischer, *The Violin Lesson*, 33–34.

[153] Ackermann and Adams, "Physical Characteristics," 70.

[154] Kempter, 50–51.

[155] Fischer, *The Violin Lesson*, 27.

alleviate symptoms by reducing the head rotation and shoulder elevation. While Watson agrees with other medical professionals that raising a shoulder rest can impede right shoulder flexion and arm pronation, he points out that adjusting both the chin rest and shoulder rest can help reduce neck tension and temporomandibular joint (TMJ) pain.[156] Similarly, Fischer claims the best approach for long-necked violinists is a combination of raising the chin rest, shoulder-rest, and actively engaging the shoulder when holding the violin.[157] Rolland notes that short-armed players often prefer center-mounted chin rests, which places the instrument higher on the shoulder.[158]

Violin teachers can confidently make initial setup recommendations through a quick assessment of body type characteristics, Dinwiddie states. There are three primary body types:

1. Endomorphic: this body type is characterized by round features. The extreme characteristics might be a short neck, round face, and rounded shoulders.
2. Ectomorphic: this body type is characterized by long and lean features, such as sloping shoulders, a long, thin neck, a small head, and a narrow jaw.
3. Mesomorphic: this body type is characterized by square features. Stereotypical characteristics might be a long, thick neck, a strong square jawline, and broad shoulders.[159]

Research shows humans always have traits from at least two of the body types. Therefore, violin teachers must consider all traits when analyzing the setup and determining the chin rest cup

[156] Watson, 35–36.

[157] Fischer, *The Violin Lesson*, 27–28.

[158] Rolland, 62.

[159] Ibid., 38.

shape and height and the amount of space to fill in beneath the violin.[160] (For more on ergonomic setup recommendations, see Chapter 5.)

3.2.3. Experience, Ability, and Vitality

Students possess various personalities, abilities, and learning styles and come from different musical and personal backgrounds. The first meeting between teacher and student offers important insights into the student's capabilities, personality, interests, and ability to learn. Thompson-Robinow assesses the following aspects:

1. Technical strengths and weaknesses (and the student's perception of their own strengths and weaknesses).
2. Musical awareness.
3. Sense of rhythm, bow use, and physical awareness and ease.
4. Communication skills and general personality traits.
5. The student's goals, extra-musical activities and interests, favorite music, and favorite performers/role models.
6. Ability to receive instructions and flexibility towards trying new approaches. (For instance, how does the student respond to suggestions for alternative bowings or fingerings?)

This helps the teacher craft an individualized program of study for each student. Involving students in your planning and goal-setting can increase their enthusiasm and student-teacher rapport.[161]

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[160] Ibid., 38–39.

[161] Thompson-Robinow, 10–12.

3.2.4. Learning Styles

Teachers may often teach in their own learning style, but students may learn best through a different learning style or sensory modality than their teacher. Most students are visual, kinesthetic, or kinesthetic learners, although some may be gustatory, olfactory, or synesthesia learners. Auditory learners often have perfect pitch and may prefer playing by ear or improvising. They may hum or sing-along unconsciously while playing and read more slowly in order to enjoy hearing each word. Auditory learners often return to the beginning of a section or piece after a memory slip because they tend to hear sections sequentially and get stuck in a mental "tape loop."[162] Some junior-high students adopt more auditory learning characteristics during this developmental phase.[163] However, not all musicians are auditory learners. Their primary strength may be their visual or kinesthetic abilities.[164] Kinesthetic learners learn best while in motion. Some may be diagnosed as ADD because of their hyperactivity, Bruckner remarks, explaining younger kinesthetic learners will lose attention if she demonstrates over 8 measures of a new piece because they want to immediately start playing.[165] Visual learners notice patterns and structural aspects of music. They use fewer words and more images in their musical descriptions, learn music quickly and have advanced sight-reading abilities, and can recall information in any order, whereas kinesthetic and auditory learners memorize sequentially and in larger chunks.[166] Visual learners may also be more right-brain or left-brain dominant.

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[162] Ibid, 42–44.

[163] Ibid., 42–43.

[164] Ibid., 41.

[165] Ibid., 46–47.

[166] Ibid., 31–32.

Visual-right brain learners prefer playing without a score, can recognize the spatial distance of an interval, recognize patterns and their relationship to the whole, and track spatial motions on the fingerboard.[167] In contrast, visual-left brain learners prefer playing with the musical score, counting interval spaces, and coding and decoding symbols.[168]

Musicians can be multi-sensory learners, but when learning new repertoire, they will prioritize one sense over the other. This affects where the brain stores the neurological experience. The predominant sense also emerges under performance pressure. Unsuccessful performances often involve the musician using a different sensory strategy than in successful performances.[169] The preferred sensory modality for information input may differ from the preferred modality for information retrieval. Bruckner cites a singer who listens to recordings to learn a new song (auditory learning) but performs the song by remembering visual imagery cues (visual learning).[170] Table 4 describes how to recognize visual, auditory, and kinesthetic learners using four research-based representational systems: physiology, eye movements, speech patterns, and speech predicates. (Speech predicates, also known as word choice, may indicate cognitive processing.[171]) It also includes clues for recognizing sensory modalities based on how students approach learning new repertoire.

Bruckner offers the following strategies for determining learning strategies in the applied lesson:

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[167] Ibid., 37.

[168] Ibid., 37.

[169] Ibid., 29.

[170] Ibid., 85.

[171] Ibid., 53.

1. Videotape lessons to observe learning styles more easily.
2. Choose one representational system to observe each week, such as looking at gestures. (Bruckner includes sample worksheets for recording observations in *The Whole Musician*.)[172]
3. Get detailed sensory feedback from students by asking them to reflect on what they remember seeing, hearing, and feeling during successful and unsuccessful performances.[173]
4. Once the teacher has an idea of the predominant learning style, they can try out specific sensory speech predicates in the lesson and see how the student responds.[174]

Teachers save instructional time by knowing which learning style the student prefers.[175] For instance, some visual learners get distracted by external stimuli and benefit from the use of visual teaching aids or graphic, colorful method books to focus their attention. Teachers can change visual stimuli in the studio (either by moving or replacing items) every two weeks to keep visual learners engaged.[176] Gustatory learners relate to food-based metaphors, while olfactory learners

[172] Ibid., 60.

[173] Ibid., 30.

[174] Ibid., 60.
Bruckner also includes lists of speech predicates for gustatory and olfactory sensory learners in *The Whole Musician*. See Bruckner, 56–58.

[175] Ibid., 61.
[176] Ibid., 39.

connect emotions to smells.[177] An auditory learner may learn pieces quickly if they are sent home with a recording.[178]

Table 4. Representational Systems for Visual, Auditory, and Kinesthetic Learners

Representational System	Visual Learners	Auditory Learners	Kinesthetic Learners
Physiological	Less extraneous movements. Stands and sits still.	Use rhythmic gestures. Tilt head to the side while listening (as if listening to a phone). Makes repetitive tapping motions when thinking or problem-solving.	Constantly changing their pose or position. Tapping toes or stomping feet rhythmically with the music. "Excessive" movements while playing.
Eye Movements	Small frequent movements. Up to their left for visual recall. Up to their right for visual construction (forming a picture). De-focused gaze indicates searching visually.	Side-to-side (lateral) movements.	N/A
Speech Patterns	Rapid speech patterns (depending on geographic location or origin).	More talkative. Speak in a medium speed with an even cadence and clear emphasis on specific words. May make clicking noise with the tongue while thinking or problem-solving.	Slower speeds. Speech accompanied by expressive hand gestures, head movement, or shifts in body stance.
Speech Predicates	Visually-based (such as "I see, or "that's clear."	Auditory-based (such as "I hear," "sounds good," or "we're on the same wavelength."	Kinesthetic-based (such as "go for it," "I don't get it," "it's starting to feel good," and "let me try").
Learning New Repertoire	Visual-right brain learners prefer to watch the teacher demonstrate first. Visual-left brain learners want to sightread first.	Want to hear the piece first.	Eager to jump in and play.

Source: adapted from Susan Bruckner, *The Whole Musician*, 5th ed. (Santa Cruz, CA: Effey Street Press, 2013), 33–35 and 42–48.

Teachers can also help strengthen students' visual, auditory, and kinesthetic sensory modalities through targeted activities in the lesson and practice room such as:

1. **Strengthening the visual modality:** encourage students to look at a musical score for longer amounts of time than they would look at a screen to help develop internal imagery.[179]

[177] Ibid., 54.

[178] Ibid., 47.

2. **Strengthening the auditory modality:** make recordings of new pieces and show parents how to help their visual or kinesthetic learners listen to their recording.[180]
3. **Strengthening the kinesthetic modality:** in groups, have students mirror each other's gestures accompanying a musical phrase. Practice imitating the movement of a performer they admire. Practice moving the spine, arms, hands, legs in different ways that reflect the music's character and emotions. Use imagery to feel the body being different weights, textures, and materials. Use cues, demonstrations, or create a "kinesthetic language" to illustrate the music.[181]

Bruckner offers many more techniques for developing sensory awareness and working with specific learning styles in *The Whole Musician*.

Part III: Knowledge of Effective Instruction

In addition to knowing information about the activity and the performer, teachers benefit from learning what contributes to effective teaching. From a QMD perspective, good instruction comprises high quality demonstrations, clear verbal explanations, summary cues, highlighting key elements, and checking for student comprehension.[182] From a music education perspective, expert teachers prioritize "deliberate instruction, detailed explanations of ways to practice, a tolerance of lower performances in some areas in order to reach other specific goals, meeting the

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[179] Ibid., 14.

[180] Ibid., 47.

[181] Ibid., 130–131.

[182] Knudson, 93.

emotional needs of students, and moving their musical achievement forward regardless of their initial starting proficiency each year."[183]

3.3.1. The Need for Formal Pedagogical Instruction

Violin treatises largely focus on critical features of technique and how to practice specific skills (knowledge of the activity) and occasionally discuss creating healthy learning environments. For example, Zweig champions nonjudgmental teaching, where mistakes are treated as opportunities to learn and solve problems, in order to reduce student anxiety and tension.[184] Similarly, Galamian encourages teachers to be "good psychologists" and to keep student morale in mind when determining appropriate feedback for the situation at hand.[185] These elements of teaching are crucial for effective communication and compassionate teaching of technique. However, violinists often begin their teaching careers without a formal understanding of effective teaching strategies. This may be because few music performance students formally learn how to teach in universities or conservatories.[186] In a study of applied music teachers' expertise and teaching philosophies, Ryan Daniel and Kelly Parkes note a little

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[183] Kelly A. Parkes and Mathias Wexler, "The Nature of Applied Music Teaching Expertise: Common Elements Observed in the Lessons of Three Applied Teachers," *Bulletin of the Council for Research in Music Education*, no. 193 (Summer 2012): 60, https://www.jstor.org/stable/10.5406/bulcouresmusedu.193.0045.

[184] Mimi Zweig, "StringPedagogy Volume One Introduction," StringPedagogy.com, accessed March 4, 2021, http://www.stringpedagogy.com/members/?submissionGuid=91efd079-45ea-4750-9993-5c0c32be626b.

[185] Galamian, 106.

[186] Jennifer Blackwell, "Research in Action: Evidence-Based Strategies to Improve One-to-One Teaching," *Journal of Research in Music Performance* (Spring 2016): 26, https://scholar.lib.vt.edu/ejournals/JRMP/2016/blackwell.pdf.

more than half of participants received formal pedagogical training through a degree or certificate program.[187]

Violinists traditionally study with a principal teacher within the master-apprentice model.[188] Universities may assume that students will naturally understand and adopt pedagogical models during private lessons. However, music education researcher Jennifer Blackwell argues that "because the applied studio is a teaching *environment* or *context*, not a *strategy* or *methodology* in itself, it is important to develop context-specific teaching strategies."[189] Violinists should be able to call upon multiple teaching methods when working with students who can vary in the ways described in this section.

3.3.2. Presenting Information

Two primary components of effective teaching are *presenting appropriate information* and *presenting information effectively*.[190] Similarly, effective string teaching requires a balance of **procedural knowledge** (knowing how to do something proficiently but not necessarily how to explain it) and **propositional knowledge** (knowing how to explain something but not necessarily able to perform it).[191] Research shows that successful teachers more efficiently present concepts than less successful teachers. Less effective forms of instruction make the QMD

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[187] Ryan Daniel and Kelly A Parkes, "Applied music studio teachers in higher education: evidence of learner-centred teaching," *Music Education Research* 21, no. 3 (2019): 276, https://doi.org/10.1080/14613808.2019.1598345.

[188] Daniel and Parkes, 270.

[189] Blackwell, "Research in Action," 26.

[190] Knudson, 88.

[191] Brenner, 48.

intervention stage more difficult, as badly taught skills also require more QMD.[192] For each student and situation, the music teacher must decide how to present information, such as through the use of demonstrations, feedback, or imagery.[193] This decision is a key component of the evaluation and intervention stages of QMD and discussed in the following chapters.

In QMD, presenting appropriate information effectively means communicating critical features through the use of **cues**.[194] Cues are an essential part of the intervention stage, as Knudson considers them one of the best ways to provide different feedback.[195] Cues turn behaviors or critical features, such as the bow being parallel to the bridge, into actions: "move the bow parallel to the bridge." Knudson recommends preparing a cueing repertoire for each critical feature associated with common errors, using a large variety of highly descriptive words or phrases to express the critical feature in behavioral terms.[196] (For an extensive introduction to cueing for violinists, see Chapter Six.) However, music pedagogy research takes a broader view on what constitutes effective instruction, considering more holistic, contextual, and developmental learning aspects of applied music teaching. Teachers with formal pedagogical training may be more likely to engage with contemporary teaching concepts, so Daniel and Parkes encourage studio teachers to learn and adopt alternative learning methods.[197] The rest of this chapter discusses instructional approaches and strategies for effective instruction.

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[192] Knudson, 93.

[193] Brenner, 51.

[194] Ibid., 85.

[195] Ibid., 90–91.

[196] Ibid., 85–86.

[197] Daniel and Parkes, 278.

3.3.3. Meta-Instructional Approaches

A growing trend in music pedagogy is **learner-centered teaching** (or LCT), a more progressive style of teaching rethinking the balance of power and responsibilities for learning in teacher-student relationships.[198] LCT emphasizes student growth and collaborative learning, as shown in Weimer's five principles of LCT:

1. Shift the balance of power from teachers to students.
2. Teach students metacognitive strategies and how to problem-solve, analyze and evaluate, and create new ideas.
3. Encourage student self-reflection on the learning process.
4. Give students some control or choice in the learning process.
5. In lessons, the teacher and student learn from each other.

Research shows music students still need mentorship from teachers and peers, but their enjoyment, motivation, interests, and attitude increase in LCT environments.[199] Teachers with formal pedagogical training are more likely to use learner-centered language when describing their teaching style, goals, and processes.[200] Violin teachers can implement a variety of student-centered learning practices in the lesson, including social learning techniques and community-building, self-regulated learning strategies, and increasing rapport.

3.3.3.1. Social Learning Techniques and Community-Building

Social learning theories like Social Constructivism propose that learning occurs during social interactions. Teachers can create studio cultures establishing clear expectations for

[198] Ibid., 269.

[199] Ibid., 271–272.

[200] Ibid., 277.

teacher-student and peer relationships and encouraging mutual respect and care for each other. Support from fellow students can be fostered through a practice buddy system or peer-mentoring program, or pairing students in joint-lessons.[201] Teachers can also create social opportunities for performance like studio ensembles, teacher-student duets, and recitals.[202] Significantly, expert teachers foster a "supportive, musically challenging culture in their studios" and view students as "complex human beings."[203] Teachers can nurture students' social and emotional skills by praising students, expressing enthusiasm about the learning process, and demonstrating good behavior and habits.[204]

3.3.3.2. Self-Regulated Learning Strategies

Self-regulated learning is another important concept in contemporary music education. British educator James Mannion explains that self-regulated learning applies metacognitive concepts—how we monitor and control our thoughts—and self-regulation concepts—how we monitor and control our emotions and behaviors—to the learning process.[205] Teachers can help build self-regulated learning skills through increasing intrinsic motivation, using scaffolding strategies, and developing metacognitive skills.

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[201] Blackwell, "Research in Action," 28.

[202] Ibid., 32.

[203] Jennifer Blackwell, "Expertise in applied studio teaching: Teachers working with multiple levels of learners," *International Journal of Music Education* 38, no. 2 (May 2020): 291, https://doi.org/10.1177%2F0255761419898312.

[204] Blackwell, "Research in action," 32.

[205] James Mannion, "Metacognition, Self-Regulation and Self-Regulated Learning: What's the Difference?" Impact: Journal of the Chartered College of Teaching, Jan. 2020, https://impact.chartered.college/article/metacognition-self-regulation-regulated-learning-difference/.

A. Motivation

Blackwell suggests that teachers reinforce student motivation through increasing intrinsic motivation. Some teachers may reward good student behavior with treats or toys, but this increases extrinsic motivation—students feel motivated to model good behavior or to practice because they get something in return. Instead, one way to increase intrinsic motivation for practicing is to give students a choice of several pieces with similar pedagogical objectives and allow them to pick one for study.[206]

B. Scaffolding strategies

Scaffolding is an essential aspect of student-centered and self-regulated learning, during which teachers guide students through the problem-solving process to develop student independence and build confidence in the practice room. Scaffolding strategies include drawing attention to critical features for error identification, simplifying tasks or techniques, teacher modeling, goal setting, and emotionally supporting the student through the learning process.[207] Expert violin and saxophone teachers, Mimi Zweig and John Nichol, believe that one of the most important goals of lessons is teaching students how to practice.[208] Teachers can model excellent playing and practice techniques during the lesson. Instead of assigning practice goals in terms of time spent practicing, Blackwell suggests showing students how to set manageable mastery goals such as "mastering a certain passage, increasing a tempo, or developing musical phrasing."[209] (See Practice Modifications.) Both Zweig and Nichol rarely discussed how to practice

[206] Blackwell, "Research in action," 30–31.

[207] Ibid., 29–30.

[208] Blackwell, "Expertise in applied studio teaching," 290.

[209] Blackwell, "Research in action," 31.

passagework during lessons observed by Blackwell, but the teachers "viewed drawing the students' attention to their errors as a major component of helping them to learn to practice, so they can hear and self-correct errors."[210]

Teachers can develop students' self-observation and evaluative skills asking guiding questions to find out the student's perceptions and thought processes before sharing observations and potential solutions.[211] This might involve asking students what they noticed while playing, in terms of rhythm, tone, phrasing, bowing, or intonation, and encourage students to begin with positive observations and ask questions for clarification and specificity.[212] Teachers can consider whether an exploratory approach benefits the student.[213] One such approach might look like the following:

1. Ask the student to observe teacher modeling and describe what they see (using prompts as needed).
2. Have the student copy the sound or movement and describe their sensory feedback.
3. Have the student explain what they did to successfully execute the task or technique.
4. The student proceeds to "teach" the technique to the teacher or a peer.[214]

Alternatively, teachers can guide students through musical explorations where the student translates musical ideas themselves into technical ideas. For example, teachers can ask students,

[210] Blackwell, "Expertise in applied studio teaching," 290.

[211] Blackwell, "Research in action," 32.

[212] Watkins and Scott, chap. 8.

[213] Ibid., chap. 1.

[214] Ibid., chap. 8.

"how does the melody sound in major compared to minor? What differences would you hear in your sound? How can we create that with your bow?"[215]

Bruckner calls this a "back-door" approach as compared to a "front-door approach" to teaching. In the traditional "front-door" approach, the teacher uses verbal descriptions and modeling to explain concepts. However, the student's imagination, experiences, or observational skills may not be refined enough for total comprehension. In a "back-door" approach, the teacher helps students find the desired emotion associated with a musical section and transfer it into physical gestures by identifying the visual, auditory, and kinesthetic properties of the emotion. This approach is based on the scientific concept of neuropeptides, where chemicals throughout the body that are released by emotions communicate back and forth with the brain. Methods for "back-door" approaches include guided questioning and experimentation (such as assigning physical gestures to specific emotions to help the body open up) and guided touch (where the teacher helps move the student's body in a manner similar to Feldenkrais and the Alexander Technique). However, guided touch requires full, informed consent.[216] (See Manual Guidance.)

C. Metacognitive Skills

Metacognitive skills help students become aware of their thought processes. Because teachers have limited amounts of instructional time, they may focus on musical content instead of teaching metacognitive strategies. However, metacognitive skills help students become independent learners. Students' greater awareness of their thought processes can assist teachers in determining what future instructions or steps are needed. Teachers can facilitate students' metacognitive processes during the lesson, when practicing, listening to recordings, or attending

[215] Ibid., chap. 1.

[216] Bruckner, 15–18.

performances, so students have a better understanding of the "*what* and *how* of music."[217] Topics to consider include students' awareness of their strengths and weaknesses, the challenges of the task at hand, useful practice strategies, goal setting, evaluating performances, crafting interpretations, memorization, motivation, time management, focus and concentration, and peak performance strategies.[218] Figure 3 describes several strategies for incorporating metacognition in the music lesson. Teachers can also use metacognition to gain awareness of their own teaching and reflect on their strategies and goals and student progress.[219]

3.3.3.3. Rapport

Although most of the concepts described here focus on information content and delivery, establishing a positive teacher-student relationship, or good **rapport**, is one of the most important elements in studio-teaching.[220] Research shows students feel secure and comfortable in teaching studios that create a safe and respectful environment, succeed when teachers establish clear expectations, high standards, and boundaries, and feel confident and enthusiastic when instructors teach with enthusiasm and positivity.[221] Building rapport benefits teachers as well, increasing their diagnostic skills, flexibility and choices, credibility, and respect.[222]

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[217] Carol Benton, "What Can Teachers Do?" in *Thinking About Thinking: Metacognition for Music Learning* (Lanham, MD: Rowman & Littlefield, 2014), 137–138.

[218] Ibid., 138.

[219] Ibid., 148.

[220] Jennifer Blackwell, "Research in Action," 27.

[221] Jo Clemons, "The Importance of Being Earnest: Rapport in the Applied Studio," *College Music Symposium*, 49/50 (2009/2010): 258, https://www.jstor.org/stable/41225251.

[222] Bruckner, 67.

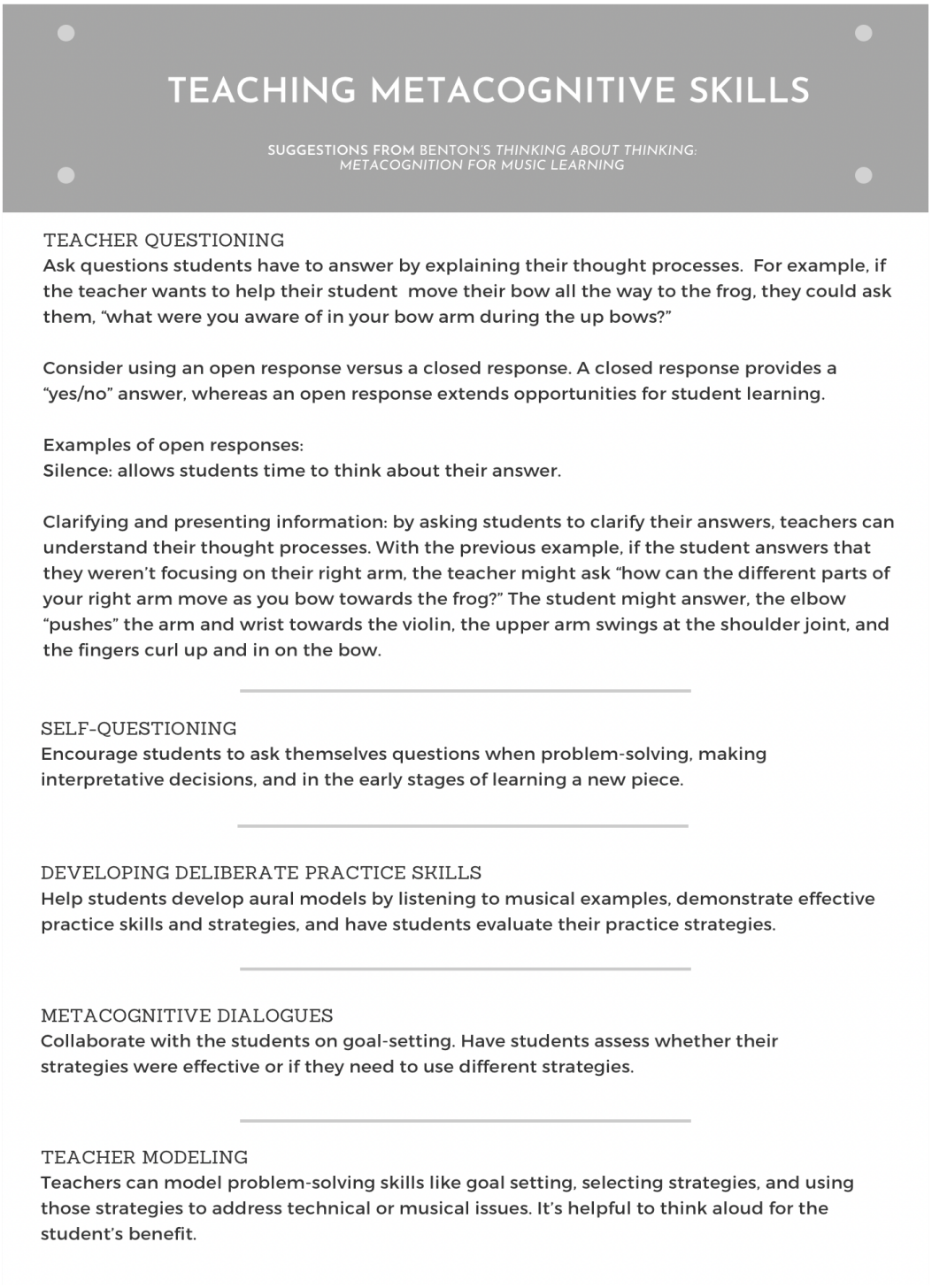

Figure 3. Teaching Metacognitive Skills. Adapted from Carol Benton, "What Can Teachers do?" in *Thinking About Thinking: Metacognition for Music Learning* (Lanham, MD: Rowman & Littlefield, 2014), 139–146.

Another way to build rapport is showing enthusiasm about music and learning with students by discussing exciting new pieces teachers are currently learning, sharing favorite recordings, asking students how they like to practice by themselves and guiding them towards alternative strategies, and expressing warmth through their tone of voice and gestures.[223] Students' vitality can be affected by teacher-student rapport and the teacher's behavior during lessons. For instance, Blackwell et al. observes more instances of laughter between teachers and high-vitality students. Teachers are more likely to ask students about their lives outside of music and to teach standing next to the student than across the room.[224] Table 5 compares other trends in teacher behaviors and lesson characteristics between high-vitality and low-vitality students. Blackwell et al. recommend teachers experiment with integrating the behaviors and characteristics identified in lessons with high-vitality students during interventions. They also encourage novice teachers to watch videos of expert teachers or reflect on behaviors observed in their own teaching videos.[225] In contrast, Bruckner claims teacher-student rapport is likely caused by shared or similar learning styles between teacher and student.[226] Figure 4 outlines strategies for building rapport by adopting elements of the student's learning style.

3.3.4. Instructional Strategies

Three instructional strategies commonly used in the applied studio include sequencing, remedial teaching, and fostering artistry.

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[223] Blackwell, "Research in Action," 27–28.

[224] Blackwell et al., "Student Vitality, Teacher Engagement, and Rapport in Studio Music Instruction," *Frontiers in Psychology* 11, no. 1007 (May 2020): 9, https://www.frontiersin.org/articles/10.3389/fpsyg.2020.01007/full.

[225] Ibid., 10.

[226] Bruckner, 26.

3.3.4.1. Sequencing

A key pedagogical skill is sequencing technique and repertoire for student development. Watkins and Scott warn that "poorly taught skills and illogical leaps in repertoire or technique create students with underdeveloped proficiency and gaps in understanding."[227] They suggest three possible reasons why: teachers may "teach by approximation" (meaning they consistently

Table 5. Teaching Behaviors Influencing Student Vitality

Student Vitality	Teacher Behaviors and Lesson Characteristics
High-Vitality Students	• Mutually agree on lesson goals and objectives. • Establish a clear lesson structure. • Students play frequently in lessons. • Students more likely to ask and answer questions. • Students work on a variety of repertoire and technical work. • Teachers ask more questions about students' understanding through informal assessments. • Teachers demonstrate and explain how they understand and think about musical and technical concepts. • Teachers are more likely to offer relevant task-specific feedback in a neutral tone.
Low-Vitality Students	• Fewer goals and objectives identified during the lesson. • Students have more choices in lesson structure and tasks. • Slower-paced lessons. • Students play less frequently and work on less repertoire. • Students ask for help more. • Students express more negative emotions. • Teachers ask "orienting" questions about the student's progress, such as "what are you working on?" • Teachers tend to model using the instrument more frequently.

Source: adapted from Jennifer Blackwell, Peter Miksza, Paul Evans, and Gary E. McPherson, "Student Vitality, Teacher Engagement, and Rapport in Studio Music Instruction," *Frontiers in Psychology* 11, no. 1007 (May 2020): 7–9, https://www.frontiersin.org/articles/10.3389/fpsyg.2020.01007/full.

accept nearly correct results without addressing systematic issues), teachers may not know how to fix fundamental issues, or teachers may "recreate their own learning experience without considering ways to reorder and improve the approach and materials."[228] In contrast, effective teachers know when and how to teach concepts. They develop "the ability to see an overlay of

[227] Watkins and Scott, chap. 7.

[228] Ibid., chap. 7.

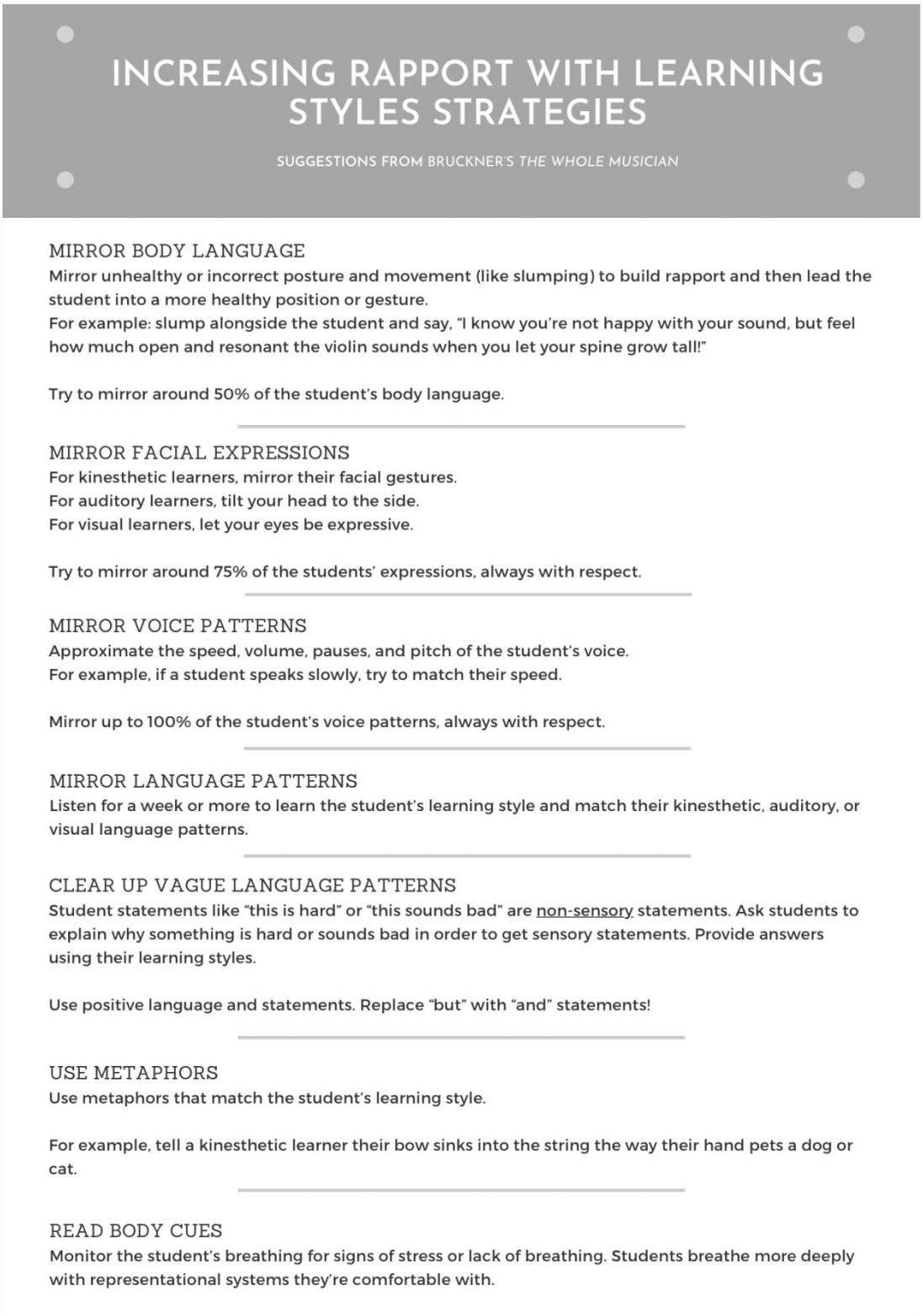

Figure 4. Increasing Rapport with Learning Styles Strategies. Adapted from Susan Bruckner, *The Whole Musician*, 5th ed. (Santa Cruz, CA: Effey Street Press, 2013), 69–78.

repertoire, skill development, and experiences that work together toward musical maturity and independence."[229]

Students trust teachers to intuitively know which repertoire to assign or offer next. Teachers should select technically and musically appropriate repertoire sequentially building students' technical and musical skills, offer diverse repertoire choices to avoid overlap among intermediate and advanced students, and consider a student's overall trajectory and goals for when they leave the studio in order to best support their growth during their time together. There are many anthologies and repertoire lists for violinists with sequentially leveled pieces and descriptions of required technical skills, including anthologies like the Suzuki Violin School, The Royal Conservatory Violin Syllabus, Barbara Barber's *Solos for Young Violinists* series, and Mark O'Connor's *The O'Connor Method,* and repertoire lists by Mimi Zweig, Kurt Sassmannshaus, and Eastman Community Music School's Violin Curriculum, among others.[230] Recent music anthologies addressing diversity and equity issues in violin repertoire include the *Violin Music by Women* and *Music by Black Composers* series. However, violinists receive little guidance in choosing and sequencing repertoire for individual students.

Teachers can consider distinguishing between repertoire for educational purposes and repertoire for performance. The teacher should have meaningful pedagogical or performance

[229] Ibid., chap. 7.

[230] For repertoire lists, see Volume One, Volume B, and Volume Two at Mimi Zweig, "Mimi Zweig String Pedagogy," String Pedagogy.com, accessed March 10, 2021, http://www.stringpedagogy.com/index.html; "Violin Curriculum," Eastman School of Music, accessed March 10, 2021, https://www.esm.rochester.edu/community/faq/student-curriculum/violin/; and Graded Repertoire Lists at "Home," ViolinMasterClass.com: The Sassmannshaus Tradition for Violin Playing, accessed March 10, 2021, https://www.violinmasterclass.com.

reasons for learning specific repertoire.[231] (An excellent place to begin reflecting on sequencing technique and repertoire is the personal inventory questions and exercises in "Chapter Seven: Sequencing," in Watkins and Scott's *From Stage to the Studio*.) Teachers can incorporate expressive musicianship into repertoire from the earliest levels of instruction and maintain artistic standards for technique and physicality by choosing appropriate repertoire demonstrating the highest standards of mastery at each level.[232] However, Zweig lets students work on three pieces concurrently at different levels: a review piece below the student's current technical level that can be performed at a high level, in order to boost confidence; a piece at the student's level, motivating them to meet attainable challenges; and a third piece above the student's level, so they are aware of musical and technical possibilities and challenges.[233]

When picking new and challenging repertoire, find pieces requiring a maximum of 4-5 new techniques for mastery. Watkins and Scott warn to not ask students what they want to play next because they may not be sequentially ready for the techniques required. However, teachers can simplify themes for students to play as a solo or duet to keep students enthusiastic about learning the violin. Or, as discussed previously, teachers can present students with multiple repertoire choices within a specified level.[234]

Meaningful selection of etudes and exercises improves sequencing. Teachers can consider whether students need to learn the whole etude or if a section suffices. Reasons to assign an entire etude include building stamina, developing stable intonation through multiple

[231] Watkins and Scott, chap. 7.

[232] Ibid., chap. 7.

[233] "How do you choose instrumental repertoire for a student," The Strad, June 14, 2017, https://www.thestrad.com/how-do-you-choose-instrumental-repertoire-for-a-student/2866.article.

[234] Watkins and Scott, chap. 7.

key modulations, fostering musicality and performance skills, or if the etude is a significant part of a curriculum. Teachers might assign only a section of an etude if the skill is comprehensively addressed within the first four lines of the etude and then repeated for the rest of the etude, or if the student must master several different skills within a technical level at the same time. Sometimes, students need to learn a piece or etude above their skill level for an audition. Teachers can consider how the student may benefit from the challenge, such as learning performance skills and preparation and practice strategies. Strategies suggested by Watkins and Scott include breaking the piece down into small, attainable goals such as learning a line or measure per day and practicing performing review pieces in order to "borrow their best tone or feeling of comfort and ease while playing portions of the more difficult music."[235]

Sequencing goes beyond considering technical and musical progressions through repertoire. For instance, how does the teacher sequence musical concepts in the earliest levels of instruction? Some elements for consideration:

1. **How old is the child beginning instruction?** Watkins and Scott advise redirecting families with very young children and no prior musical experience to take a movement and singing or children's music class first.
2. **Does the student have aural skills training?** In the first lessons, the teacher can introduce vocal sirens, high and low pitch identification, matching exercises like teacher to student and vice versa, or voice to instrument and vice versa, and improvisation exercises involving tapping or clapping.

[235] Ibid., chap. 7.

3. **Has the teacher provided clear directions for establishing setup, posture, and alignment with the violin?** Can the student show a clear understanding of how to hold the violin and bow?
4. **When and how should the teacher introduce music reading?** One approach introduces note and symbol recognition first (the student recognizes whether the melody moves higher or lower), then note translation (the student reads pitch and rhythm independently of each other at slow or inconsistent tempi, practices identifying familiar pieces with the title removed, and is given a starting note and finds their way through a familiar piece), and finally sight-reading with musical expressiveness.
5. **Can an advanced skill or concept be introduced safely in the early levels of instruction without negatively affecting the student's fundamental skills?**[236] For instance, Zweig introduces preparatory shifting exercises in the first violin lesson as the student slides their hand on the Magic X up and down the fingerboard.[237] But while she introduces the large muscle actions involved in vibrato in beginning lessons by tapping rhythms on the high dot marking the octave above the open string, Zweig waits to officially teach vibrato "until the student's hand position is relaxed and comfortably set in first position. For some students this may occur at the end of Suzuki Book I, while for other students it may take longer."[238]

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[236] Ibid, chap. 7.

[237] Zweig, "Shifting Link."

[238] Mimi Zweig, "Vibrato Link," String Pedagogy.com, accessed March 4, 2021, http://www.stringpedagogy.com/members/?submissionGuid=91efd079-45ea-4750-9993-5c0c32be626b.

Teachers also should consider how to sequence non-technical concepts like music theory and history and performance practice in different levels.[239] One option providing graded theory and history instruction is The Royal Conservatory's *Celebrate Theory* series, which corresponds with the levels in their violin syllabus.

3.3.4.2. Remedial Teaching

During remediation, teachers must "balance the responsibility of providing direction and constructive feedback with the flexibility to attend to the psychological/physiological circumstances of every student."[240] Violin teachers must create safe and trusting environments so students feel comfortable committing to remedial work. Students respond differently to remediation depending on "how correction was addressed in their prior education, their sense of self-efficacy, personality, and motivation to set personal goals."[241]

When first working with a transfer student or postsecondary student, teachers can assess their skills through long tones, scales, and comfortable pieces aiming for a beautiful sound. (For young students, this might be a folk song.) Validating the student's strengths before addressing challenges helps with morale. If the student enters the studio playing repertoire out of sync with the current technical ability, Watkins and Scott caution against labeling easier pieces as "easy" or telling the student, "we need to go back." Instead, alternative approaches include using scales and basic technical exercises to build technique, slowing down, simplifying, or breaking down

[239] Watkins and Scott, chap. 7.

[240] Mio, "The Need for Remedial Pedagogy," 37.

[241] Mio, "An investigation of postsecondary violin instructors' remedial pedagogy," 301.

repertoire into manageable skills, and having a variety of repertoire at each level so students feel like they are progressing.[242]

Some students may resist remedial work.[243] To motivate students, teachers can create situations where students immediately see, hear, and feel how a new position or behavior improves their playing. Watkins and Scott recommend the following:

1. Start with the basics and move incrementally.
2. Give clear, specific instructions for practicing assigned remedial exercises.
3. Demonstrate the value of remedial work. Communicate the level where students are at currently, what you see in their playing, and where they can go.
4. Increase student motivation by connecting the technique or behavior to their desires, such as playing specific repertoire or performing with ensembles.
5. Empathize with the challenges of relearning concepts and express appreciation for the student's commitment to learning.
6. Remind students these changes will feel more comfortable and automatic in the future.[244]

3.3.4.3. Fostering Artistry

Expert teachers advocate teaching "independent artistry" and guiding students of all ages towards making artistic decisions.[245] Developing musicianship and artistry requires many diverse self-regulatory, analytical, and performance skills, knowledge of music theory, history, aural skills, and performance practice, and extra-musical explorations of the humanities, math and

[242] Watkins and Scott, chap. 7.

[243] Mio, "An investigation of postsecondary violin instructors' remedial pedagogy," 301.

[244] Watkins and Scott, chap. 7.

[245] Blackwell, "Expertise in applied studio teaching," 292.

science, religion and art, and human emotions and senses.[246] This aspect of effective instruction goes beyond the scope of this document, but there are many resources available for exploring artistic ideas and development, including Thompson-Robinow's *The Embodied Musician,* Watkins and Scott's *From Stage to the Studio*, Zander and Zander's *The Art of Possibility*, and Merfeld's *Is It So If You Think It's So: Thoughts On Teaching And Performing Chamber Music, An Anti-Manual*.

Summary

Effective QMD requires thorough knowledge of the activity, performer, and effective instruction. This chapter explores a wide variety of concepts not normally discussed in violin performance degrees and aims to provide comprehensive consideration of all aspects of becoming a teacher. Violinists traditionally draw on knowledge from their experience and expert opinions, especially violin treatises. However, knowledge of biomechanics and functional anatomy provides crucial information about how the body moves while playing. Analyzing violin-playing through the hierarchy of fundamental movement patterns and principles of critical features, common errors, and motor development sequences offers new perspectives in reading and deciphering pedagogical treatises. Violinists can learn to translate often-dense paragraphs of technical jargon into critical features, common errors, and pedagogical cues and more easily compare technical principles between different pedagogical approaches. Information regarding the performer's age, physiology, learning styles, experience and other abilities helps teachers tailor their instruction and recommendations to the individual student. Teachers can explore additional training and resources for learning more about child and developmental psychology and working with students with disabilities or receiving special education services. Music

[246] Watkins and Scott, chap. 1.

education research shows that expert teaching involves facilitating positive learner-centered environments, building rapport with students, providing thoughtful sequential instruction and supportive remedial processes, and developing students' metacognitive skills.

Teachers should not feel discouraged or overwhelmed by any lack of knowledge because learning is a continual process. Violinists can work to add new knowledge gradually as they become aware of their knowledge gaps and acquire new pedagogical materials.

Chapter Four: The Observation and Evaluation of a Student's Movement

Equipped with knowledge gained in the preparation stage, teachers begin the process of observing, evaluating and diagnosing issues, and providing interventions during the violin lesson. This chapter discusses how to adapt concepts from the observation and diagnostic evaluation stages of QMD for use in the violin studio.

Part I: The Observation Stage

Observation is the "process of gathering, organizing, and giving meaning to sensory information about human motor performances."[1] The observation process can be viewed a continuous stream of assessment data being collected throughout music instruction, helping make vital decisions "when and how to convey information, assign tasks, and structure learning experiences that develop physical and intellectual skills effectively."[2] Part I discusses the role of perception and systematic observational strategies in QMD. (A quick note—throughout this chapter, I will refer to two different kinds of performance: musical performance of excerpts, etudes, and repertoire; and kinesiologists' definition of *performance*, which refers to any specific movement being performed during activity.)

4.1.1. Sensory Perception

The four major senses used in QMD are vision, audiation (hearing), touch, and kinesthetic proprioception. The senses work both individually and collaboratively, each sense providing important and unique information about human movement.[3] Through perceptual

[1] Knudson, 98.

[2] Knudson, 56.

[3] Ibid., 47.

activities, the observer organizes and assigns meaning to sensory information.[4] Four key tasks must occur when perceiving movement:

1. **Detection**: determine stimuli or events occurred.
2. **Discrimination**: differentiate between various stimuli.
3. **Recognition**: identify previously occurring stimuli or new stimuli.
4. **Identification**: respond to or make a judgement of a stimulus.[5]

Music educators like Robert Duke believe that teachers should constantly evaluate students throughout instructional time.[6] This means that teachers are often simultaneously observing and evaluating student performance. In contrast, QMD separates the observation and evaluation processes into two different stages to improve perceptual and analytical accuracy.[7]

In his three-stage process for determining what to work on in the violin lesson or in the practice room, Simon Fischer states that "the first thing is to notice everything. You have to hear, see, and sense everything that is happening in the playing—every detail of technique, expression, posture and so on—without missing a thing."[8] Most violin teachers adopt this approach in the violin lesson, taking notes or annotating sheet music while a student plays a scale, etude, or current repertoire from start to finish. However, how can one expect to hear, see, and sense everything in performance, as Fischer suggests? The observation stage is influenced by the

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[4] Ibid., 62.

[5] Ibid., 62–63.

[6] Robert A. Duke, *Intelligent Music Teaching: Essays on the Core Principles of Effective Instruction* (Austin: Learning and Behavior Resources, 2005), 57.

[7] Knudson, 98.

[8] Fischer, *The Violin Lesson*, xviii.

perceptual abilities and specific biases of the observer.[9] Our brain automatically integrates and prioritizes sensory information.[10] Duke explains that "our minds select—sometimes consciously, often not—what seems to be the most important and advantageous to attend to. This perceptual selectivity is the combined result of some hard wiring in the human perceptual apparatus and our learning from past experiences."[11] Observing movement requires sufficient time to process information without rushing into the evaluation stage.[12] Movement analysts may inadvertently suffer from inattentional blindness—the inability to see an object or miss parts of the field of vision because of attentional and cognitive processing.[13] It is highly unrealistic to expect the violin teacher to comprehend everything happening during the student's performance.

In athletic disciplines, observation has traditionally been limited to "identifying errors in performance based on some model of 'good form' envisioned by the teacher or coach."[14] Similarly, violin teachers make observations regarding posture and alignment based on personal opinions of ideal playing postures influenced by various schools of violin technique. To ensure that they gather unbiased information and are well-prepared for observation, instructors can develop a systematic observational strategy.[15]

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[9] Knudson, 99.

[10] Ibid., 60.

[11] Duke, 57.

[12] Knudson, 67–68.

[13] Ibid., 48.

[14] Ibid., 98.

[15] Ibid., 98.

4.1.2. Systematic Observational Strategies

A **systematic observational strategy (SOS)** collects relevant information about human movement, incorporating multiple modes of sensory perception. It determines what to focus on and how to observe during performance.[16] Violinists can use an SOS to be more intentional in their observations. An SOS requires extra planning prior to lessons, but allows the teacher to maximize their 1-2 hours per week with students. Questions the teacher might consider include:

1. What stage of the learning process is a specific piece of repertoire or individual technique?
2. Is it time for a run-through to gauge overall progress on a piece, test endurance, or prepare for a performance?
3. Is there a specific technical or musical element or instructional theme that can be explored through targeted observations?

Beyond the lesson, violinists can design systematic observational strategies to observe any kind of performance-based instructional session, including masterclasses, rehearsals, and even individual practicing. Five major elements comprise a successful SOS: selecting a scanning strategy, controlling the observational situation and environment, planning observational vantage points, determining the number of observations, and creating contingency plans for extending observational trials as needed.[17]

4.1.2.1. Scanning Strategies

A scanning strategy identifies what to observe, when, and for how long. When planning a scanning strategy, observers must consider several variables including critical features,

[16] Ibid., 98–99.

[17] Ibid., 101.

environmental factors, changes in movement quality, extraneous motions, and indicators of fatigue and stress. The following four approaches can be used to organize a scanning strategy.

A. Phases of movement

Watch for critical features in the three phases of movement performance. Kinesiologists divide movement into three phases—preparation, execution, and follow-through.[18] Violinists often break down technique into its left-hand and right-hand components, but every left and right hand/arm movement involved in violin technique can be further broken down into these three phases. For instance, when a violinist shifts from first position up above the bout to fifth position, the movement of the left arm can be broken down into three phases: the position of the arm and hand before the shift, the movement of the arm during the shift, and the position of the arm and hand in the new position. Critical features that teachers usually look for include the angle of the arm and hand frame in first position, the release of the thumb and the arc of the elbow while shifting, and the angle of the arm and hand frame in fifth position and thumb placement at the bout. Analyzing critical features in the three phases of movement works best when isolating specific technical elements during a lesson. This approach makes it easy to incorporate additional biomechanical critical features into the analysis, such as observing the movement of the head of the humerus (upper arm bone) in the shoulder joint as the arm shifts from first to fifth position in the previous example.

B. Base of support

Look at the performer's base of support—the feet, legs, and pelvis—and the initial leg and arm movements to see how they affect subsequent movements.[19] Kempter notes that "many

[18] Ibid., 102.

[19] Ibid., 104.

biomedical faults of the upper body are due to improper alignment of the lower body, particularly the pelvis. However, violin teachers often ignore the lower body while focusing correction on upper-body position."[20] Not establishing a solid foundation and balance with the feet, twisting the spine, or pulling down or in on upper back and shoulder muscles can set off chain reactions of tension.[21] To address this, teachers can check lower-body alignment first when addressing upper body issues to ensure that the knees are relaxed and slightly bent, the pelvis and hips are neutral and not swaying forward, and the shoulders are relaxed and aligned over the pelvis.[22]

C. Safety and biomechanics

Watch for critical features in ranked order of importance based on movement safety and biomechanics. As discussed in Chapter Three, experts and professionals may rank critical features based on differing opinions regarding biomechanical research and experience.[23] Many violin teachers working with young students, for instance, look for NEST: the nose, left elbow, violin scroll, and left toe all aligned vertically while playing. However, Kempter questions NEST being appropriate postural guidelines for all student body types and offers an alternative set of postural critical features based on Ideokinesis principles in *How Muscles Learn*.[24] Other teachers draw from the Alexander Technique and Body Mapping traditions and predominantly focus on

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[20] Kempter, 16.

[21] Fischer, *The Violin Lesson*, 165.

[22] Kempter, 17.

[23] Knudson, 105.

[24] Kempter, 12–17.
Ideokinesis is a somatic method using guided imagery to improve movement and influenced other somatic practices like the Franklin Method.

the alignment of the head on the spine at the atlanto-occipital joint (A.O. joint) and other places of balance. For example, Jennifer Johnson advises teachers to look for five points of contact between the violin and the body: the jawbone, collarbone, side of the neck, left hand, and bow hair friction with the string.[25]

The wide variety of movement disciplines, postural models, and medical opinions available offer violinists many options for ranking critical features of posture and alignment. These also can be used to rank critical features of specific techniques. In all observations of violin playing, teachers should ensure the student moves safely and in as healthy a manner as possible.

D. Gestalt to specific

Instructors using gestalt observational models base their initial reactions on their primary impressions of overall movement quality. Once they've formed an opinion, they examine specific critical features using short-term memory recall or by repeating the observation. This less-structured approach can be more natural for some teachers and allows them to integrate a variety of multi-sensory information.[26] The gestalt observational model approach may be most familiar to violinists in the masterclass setting, where a teacher has limited amounts of time to work with each student, and the audience expects to take away useful information from the class. Many engaging masterclass teachers listen to a student perform, pick an overall theme to work on with the student, present several key principles or critical features necessary for success, and experiment with the student using specific examples from the piece they just performed. Gestalt observational models of movement follow a similar structure. The teacher looks at the movement

[25] Johnson, 41–45.

[26] Knudson, 69–70.

to get an overall impression of the quality of movement and then isolates specific issues by looking at the phases of movement or individual anatomical parts or groups.[27] Let's say a student consistently struggles to use their whole bow while playing. The teacher can ask the student to play a simple scale or open strings and observe without looking for specific critical features. They might notice whether the student's right hand or arm looks stiff, where the student changes direction before reaching the frog or tip of the bow, and how their bow moves across the string. Once the teacher gains a general impression of the arm movement, they can analyze the various components—are the right-hand finger and thumb joints flexible and rebalancing the bow as the bow moves to the frog? Is the right arm at the appropriate string level? Does the forearm pronate, meaning the ulna and radius rotate around each other throughout the whole bow stroke? Does the head of the humerus freely move in the shoulder joint, and does the whole shoulder move flexibly?

4.1.2.2. Observational Situation

Observation parameters need to be controlled, but be as realistic as possible. The teacher can consider both the situation and the performer in front of them. What kind of performance is under observation? Is it a competition, recital program, masterclass, or a rehearsal leading up to a major event? Is it appropriate to simulate distractions at this point? What is the student's ability level—beginner, intermediate, or advanced? What is their current level of fitness and conditioning? Is the student prone to suffer from performance anxiety?[28]

[27] Knudson, 105–106.

[28] Ibid., 106.

Consider setting up observations during the early stages of skill acquisition in a closed environment in order to eliminate extra performance pressure.[29] Teachers might encourage students to perform short segments of recently assigned repertoire rather than full run-throughs in lessons. New technical elements can be observed without musical context to review and refine body mechanics, building skills sequentially from simplified forms to more complex iterations.

4.1.2.3. Vantage Points

Set up multiple vantage points ahead of time to see different aspects of movement. Certain vantage points may be more optimal for observing various critical features than others.[30] Violin teachers often sit or stand in front of the student with at least 3–6 feet of separation during the initial observation. Many teachers advocate for positioning a full-length mirror behind the student in order to see from a second vantage point. However, other angles may yield important insights into movement and alignment, such as observing a movement perpendicular to the plane of motion.[31] For example, examining violinists from the side helps assess spinal alignment and arm and shoulder movements. From a kinesiological perspective, observers should be as far away as possible from the movement in question without missing details.[32] However, violin playing is made up of both large and small muscle movements, so teachers can alternate between

[29] Ibid., 107.

[30] Ibid., 107.

[31] Ibid., 107.

[32] Ibid., 109.

monitoring students up close for elements like fingering and far away for whole-body assessments.[33]

4.1.2.4. Number of Observations

How many times should a teacher observe the movement in question? The number of repetitions depends on the type of skill being observed and the time available. Kinesiological research finds that observations of adults require 5–8 repetitions to gain enough information for evaluation and intervention, while children require around 6 repetitions. Why so many repetitions? As previously mentioned, inattentional blindness may affect what observers perceive during an event. Repeated observations not only help the instructor see more but establish a baseline for consistency. Not all errors need to be individually addressed. Recurring errors indicate underlying technical issues rather than an occasional error that may be caused by performance anxiety, distractions, or accident.[34] To be clear, violin students don't need to play their entire piece 5–6 times through in a lesson. But if a teacher notices the student playing a few measures out of tune, they might isolate that spot in the music and do repeated observations to gauge whether it is a persistent problem with coordination, shifting, the hand frame, etc.

4.1.2.5. Extended Observation (Video)

Videotaping observations for QMD is highly recommended.[35] Video offers an objective perspective for movement analysis, as video cameras set up from multiple vantage points allow the coach to see front, side, and back views of the athlete. Playback tools like freeze-frame and slow-motion make it easy to analyze elements of performance multiple times—reducing

[33] McAllister, *The Balanced Musician*, 334.

[34] Knudson, 109–110.

[35] Ibid., 110.

performer fatigue—and see movement at speeds beyond the capabilities of the naked eye.[36] Video feedback helps athletes reconcile what they kinesthetically experience during performance with what the coach sees and know exactly how much progress they've made. Qualitative video feedback can be integrated into weekly training sessions to maximize its usefulness.[37]

Video can be a valuable pedagogical tool in the violin studio for analyzing body alignment and violin technique. With today's technology, teachers can easily use smart phones, tablets, and laptops to record high-quality video. Alexander Technique teacher Lori Schiff suggests using video to observe musicians' alignment and overall body use from the side profile.[38] Physiotherapist Howard Nelson advises reviewing video without audio in order to conduct unbiased evaluations of body mechanics. Later, after making any desired changes, Nelson recommends re-recording the same excerpt while focusing on the change and comparing the two recordings aurally. He states that 99% of the time, musicians prefer the way they sound when using their body more effectively.[39]

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[36] Barry D. Wilson, "Development in video technology for coaching," *Sports Technology* 1, no. 1 (June 2008): 35–36, https://doi.org/10.1002/jst.9.

[37] Ibid., 38.

[38] "Lori Schiff: The Alexander Technique—At Home with Yourself," hosted by Dr. Renée-Paule Gauthier, Mind Over Finger, on Mind Over Finger, Nov. 6th, 2020, https://www.mindoverfinger.com/podcast/episode/3ffee04b/080-lori-schiff-the-alexander-technique-at-home-with-yourself.

[39] Howard Nelson, "Self-videotaping to identify and improve physical problems," June 21, 2020, Vimeo video, 4:56, https://vimeo.com/431269545.

4.1.2.6. Other Recommendations

Which SOS should teachers use? Kinesiological research on effective strategies is inconclusive, so instructors can use the strategy with which they are most comfortable.[40] Teachers can also use written plans like rubrics, checklists, diagrams, rating scales, or task sheets during observation to check for specific critical features.

Good QMD is a collaboration between the teacher and performer. Kinesiological researchers Hay and Reid assert that performers become more kinesthetically aware of their bodies as they become more skilled.[41] Kinesthetic proprioception communicates how muscle tension affects the various parts of the body and information about movement quality, speed, and muscle load.[42] The teacher can supplement their QMD with kinesthetic observations from the performer and be especially aware of the performer's feelings of pain and fatigue.[43] One way to incorporate kinesthetic observations in the violin studio is to ask students what they noticed or felt after playing.

4.1.3. Summary and Observational Systems in the Violin Studio

Violin teachers use whole-picture observation models during applied violin lessons. Because teachers can suffer from inattentional blindness and observer bias, Knudson recommends preparing a systematic observational strategy (SOS). In formulating an SOS, instructors should consider what kind of scanning strategy best fits the situation at hand. Multiple

[40] Knudson, 102.

[41] Ibid., 111.

[42] Ibid., 58.

[43] Ibid., 111–112.

observations, additional viewing angles, and video feedback are ways to improve the quality of observation.

Teachers may feel reluctant to change their methods of observation. The traditional violin lesson structure largely remains the same as it has for decades, so why change what works? Adopting an SOS may seem intimidating, time-consuming, or even too structured an approach for teachers. Instead of preparing individual strategies for each student, lesson, or event, consider creating basic models of SOS that can be quickly adapted for a variety of students and scenarios. These might include formulas for masterclass or studio class observation, pre-performance simulations of repertoire, specific left-hand and right-hand technique observation, observations of brief excerpts or etudes/caprices with an emphasis on specific critical features or technical goals, or observations of brief excerpts or etudes/caprices moving from general impressions to specific analysis.

Part II: The Evaluation and Diagnosis Stage

QMD distinguishes between the observation stage, where the violin teacher observes the performance, and the diagnostic evaluation stage, where they determine what is the problem and how to fix it.

The two essential skills required for the evaluation and diagnosis stage of QMD are:

1. The ability to evaluate strengths and weakness of movement performance.
2. The ability to diagnose the most important weakness needing improvement.

These important skills help teachers figure out the most important and effective kinds of intervention.[44]

[44] Knudson, 116.

4.2.1. Evaluation and Diagnosis in Music Performance Literature

Music performance literature primarily focuses on the development of self-evaluative skills in the practice room and after performance. Self-assessment, defined as "the ability to regulate one's own learning through diagnosing problems in individual performance, and prescribing solutions," is one of the most important skills for music students to develop.[45] The ability to detect errors is both an essential aspect of self-regulation and an important tool for musical evaluations. However, the performance errors highlighted in the literature are mostly related to playing the correct notes or using the appropriate style.[46] Evaluative rubrics like the Quality Assessment in Music Performance Inventory (QAMPI), a tool for pianists to evaluate their performances compared to their practice using video recordings, include criteria such as memory and tempo control, tone quality, expressiveness, and note, rhythmic, articulation, and dynamic accuracy.[47] Recommendations for improving error detection similarly involve improving listening skills and developing an ideal performance sound concept, such as studying a score with an "error-free recording" to improve detection of pitch and rhythm mistakes.[48] However, musicians will miss errors even when reviewing an audio or video recording unless

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[45] Jason M. Silveira and Russell Gavin, "The effect of audio recording and playback on self-assessment among middle school instrumental music students," *Psychology of Music* 44, no. 4 (2016): 881, https://doi.org/10.1177%2F0305735615596375.

[46] Ibid., 882.

[47] Masaki, et. al, "Piano performance assessment: Video feedback and the Quality Assessment in Music Performance Inventory (QAMPI)," in Proceedings of the International Symposium on Performance Science 2011, ed. Aaron Williamon, Darryl Edwards, and Lee Bartel (Utrecht, The Netherlands: European Association of Conservatoires (AEC), 2011), 505–507.

[48] Noa Kageyama, "How to Get Better at Detecting Errors - Especially If They're Hiding in Plain Sight," The Bulletproof Musician, accessed Feb. 23, 2021, https://bulletproofmusician.com/how-to-get-better-at-detecting-errors-especially-if-theyre-hiding-in-plain-sight/?hilite=%27Recording%27.

they develop a system for evaluation.[49] We need systems and criteria for evaluating both technique and the body movements involved.

Applied violin pedagogy literature also largely overlooks the development of evaluative skills for the instructor. In *Principles of Playing and Teaching*, Galamian states:

> The teacher must discover both weaknesses and strengths. He must judge the potentialities of the student and decide whether there are hindrances in the way of their development; whether there are bad habits involved or dangerous tendencies present. Such things as weak fingers or joints must be noticed.[50]

Similarly, Rolland describes an evaluative approach used for remedial teaching as "recognizing faulty actions and deliberately replacing them with desirable ones."[51] But how does the teacher do this? What are the processes for evaluating students' playing and determining the necessary interventions in the applied lesson? Many violin treatises offer information regarding critical features, developmental techniques, and helpful exercises for intervention, but fail to provide guidance on efficient and effective evaluation practices. A notable exception is Simon Fischer's *The Violin Lesson*, which encourages violinists to analyze their playing through the framework of "pitch-sound-rhythm-ease."[52] Fischer recommends asking two fundamental questions:

1. "Does it sound right, i.e. is this the pitch and the tone I want, and with exactly the right rhythm?" And,
2. "How can I work less hard but get the same result?"[53]

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[49] Kageyama, "How to Get Better at Detecting Errors."

[50] Galamian, 105.

[51] Rolland, 182.

[52] Fischer, *The Violin Lesson*, 94.

[53] Ibid., 95.

These questions help performers consider note and rhythmic accuracy, musical expressivity, and the physical efficiency of their playing. Fischer goes further than many violin pedagogues in his methods for diagnosing technical and physical weaknesses, which are discussed in section 2.3.1. However, violinists can also benefit from more systematic, research-based approaches to improve their evaluative and diagnostic skills and to prioritize both musical and physical elements for intervention.

4.2.2. QMD Evaluation

Two primary methods of evaluation are used in QMD: the sequential method and the mechanical method. Using the **sequential method**, instructors compare the body positions and movements they see with a mental image of what they expect to see.[54] Musicians often have an image of the ideal musical performance, such as the image described by Fischer:

1. "Every note is musically and expressively in tune,"
2. "Every note has exactly the desired sound, free of tonal blemish, one which creates the phrasing, style and character that you want, and contains within it the chosen mood, drama, emotion and expression of the phrase,"
3. "The timing of every note is precise, and at the same time full of musical character and expression," and
4. "Every note is played with real ease, and with complete absence of unnecessary action or effort."[55]

However, musicians likely have images of ideal posture, alignment, and technique in mind as well as an ideal sound.

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[54] Knudson, 117.

[55] Fischer, *The Violin Lesson*, 95.

Knudson estimates that the sequential method is the primary form of QMD because observers are more comfortable with ideal mental images of critical features. However, it may lead to overemphasizing error detection. In comparison, the **mechanical method** uses critical features based on mechanical (or biomechanical) principles to evaluate motor skills, such as range of motion.[56] Unless violinists have extensive experience with biomechanics or somatic methods, they likely use the sequential method to analyze violin technique.

4.2.2.1. Methods for Improving Evaluation

1. **Experiment with integrating biomechanical principles into a sequential method of evaluation.**[57] For instance, violinists could use Body Mapping principles from Johnson's *What Every Violinist Needs to Know About the Body* and anatomical principles from other somatic methods or kinesiology experts.
2. **Make critical features the focus of evaluation.**[58] Violinists can use critical features described in treatises, masterclasses and seminars with expert teachers or body mechanics specialists, and/or their own instructional experience.
3. **Stick to 4–8 critical features as the basis for evaluation.**[59] For self-evaluation, choose one type of error to listen or watch out for at a time and to gradually add in the number of errors or instruments into your awareness. Or, when working in or with a chamber ensemble, divide up the listening duties so each member listens for a different type of

[56] Knudson, 117.

[57] Knudson, 118.

[58] Ibid., 118.

[59] Knudson, 118.

error or musical concept.[60] This strategy can easily be adapted to any kind of critical feature, musical or physical, with a maximum of 4–8 elements in one period.

4. **Use a rating system such as a three-ordinal scale identifying a movement as inadequate, within a desired range, or excessive, or using a visual analog scale (for example, measuring range of motion from too little to too much movement).**[61] Rubrics are rarely discussed as pedagogical tools outside of formal assessments (such as a jury, adjudicated masterclass, or competition). However, a movement rubric could be useful in tracking the change in a movement or alignment over time via video or photo observation.

4.2.2.2. Difficulties with Evaluation

Multiple factors may make evaluation difficult. Instructors must determine whether an error involving a critical feature is a temporary problem—and therefore within the range of correctness—or a consistent issue—and therefore a technical weakness.[62] For instance, if a student plays out of tune during a passage, is it indicative of a frequent technical issue involving the hand frame, understanding of finger patterns, or the shifting mechanism? Is the student struggling with excessive tension in their hand or arm that affects their accuracy? Or is it the result of a lapse in concentration or other accident? Repeating observation trials 5–8 times allows instructors to clearly evaluate the situation with students of all ability levels.[63] However, the difference between temporary and consistent errors will be subtler with advanced performers.

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[60] Kageyama, "How to Get Better at Detecting Errors."

[61] Knudson, 118.

[62] Ibid., 119.

[63] Ibid., 119.

Fischer recounts an incident with noted violin teacher Dorothy DeLay where she confessed it took her three months to determine the next step for a gifted student of hers at Aspen Music Festival.[64] Differences in expert opinion regarding critical features—such as what is identified as a critical feature, the ranking of critical features and their order of importance, or the range of correctness of a critical feature—may affect evaluation as well.[65]

Performance errors can also have multiple sources. Knudson classifies four types of performance errors:

1. **Biomechanical**: technique errors, body position, or timing issues.
2. **Physiological**: strength, endurance, or flexibility issues.
3. **Perceptual**: technical mistakes or mistakes related to the performance environment.
4. **Psychological**: attitude, motivation, performance anxiety, etc.[66]

Determining the source of a performance error might be the most challenging part of the evaluation and diagnosis stage. In order to more accurately identify performance errors, teachers can ask their students to provide feedback about their sensory perceptions and mental state.

Instructors using a sequential method of evaluation may compare all of their students' critical features and movements to a singular ideal form. However, situational and individual factors affect what is optimal for each performer. Knudson believes it is easier to define and update critical features than rely on one ideal form. Teachers can become aware of other kinds of observer bias, including gender and age. In athletics, younger performers' skill levels tend to be

[64] Fischer, *The Violin Lesson*, xxi.

[65] Knudson, 119.

[66] Ibid., 120.

underrated, whereas older performers' skill levels tend to be overrated in athletics. Prior knowledge of the student can also influence the teacher's evaluation as well.[67]

4.2.3. QMD Diagnosis

Diagnosis in QMD is defined as a "judgement that identifies the underlying causes of poor performance from the observed strengths and weaknesses. Diagnosis is used to set priorities for possible intervention."[68] Teachers should consider prioritizing interventions because motor learners usually can focus on only one correction at a time. It also helps prevent the teacher from experiencing analysis paralysis. When prioritizing interventions, instructors draw on their knowledge from the preparation stage. For example, an athletic instructor uses their knowledge of biomechanics and situational knowledge of motor development, motor learning, exercise physiology, pedagogy, and psychology to ask, "is the optimal form possible for the learner or performer based on their current development stage, skills, flexibility, and strength?"[69]

2.3.1. Intervention Rationales

There are many rationales used to prioritize interventions in QMD. The following six rationales may apply to different situations in the violin studio.

A. Relationship to previous actions

Some errors can be directly attributed to previous errors. Therefore, teachers can prioritize addressing the underlying error, such as an issue with posture or alignment.[70] For

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[67] Ibid., 120–121.

[68] Ibid., 124.

[69] Ibid., 123.
This question is similar to Fischer's two fundamental questions on pitch-sound-rhythm-ease.

[70] Ibid., 125.

example, Fischer attributes some of these previous errors to chain reactions in the body. If violinists "feel tension or other blockages in [their] arms, hands and fingers, there are usually a multitude of interrelated factors responsible. Many of these factors are subtle or imperceptible aspects of technique which, although seemingly insignificant, set off chain-reactions of tension that spreads throughout the entire playing."[71] Squeezing, or the contraction of certain muscles holding the violin and bow, can be a common origin of chain reactions while playing.[72] The body is continually balancing between hyper mobile (excessive) and hypo mobile (restricted or limited) movements during violin-playing. Fischer reminds teachers that when they "see something excessive in one area of playing it is often necessary to look to another are of the body entirely. If there is too much or too little of something it is likely that a balancing will be going on somewhere else."[73] Table 6 summarizes common technical issues identified by Fischer that may have an origin somewhere else in the body.

One issue with this approach is that professionals—even in athletics and kinesiology—are making educated guesses about movement that usually, but not always, agree with biomechanical knowledge. Teachers can improve their diagnosis by expanding their knowledge of anatomy and biomechanics. Instructors should also consider whether the error is caused not by a previous movement error, but by performance anxiety or other mental and emotional factors.

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[71] Fischer, *The Violin Lesson*, 164.

[72] Ibid., 164.
For a list common origins of chain reactions in the body, see Fischer, *The Violin Lesson*, 165.

[73] Ibid., 192.

While Knudson suggests helping students focus on the movement, teachers may see a need to work on mental skills like mindfulness or breathing instead.[74]

Table 6. Possible Causes of Common Technical Issues for Violinists

Technical Issue	Possible Causes
Hip rotation while rapid bow strokes.	Upper arm and elbow locked.
Excessive right wrist movement (appears as extreme changes in wrist angle at frog and tip).	Locked index finger (hypo mobile). Limited forearm rotation.
Excessive left hand movements (bending at wrist) to place fingers on strings.	Left elbow stuck on one string level (i.e. the G string).
Vibrato is too wide or too slow.	Locked left fingernail joint
Left arm movements locked (trouble descending melodically from first to fourth finger).	Hand tight, contracted.
Difficulty playing at the frog and tip.	Right hand fingers clenching the bow.
Head moves contrary to the bow.	Lack of awareness of alignment.
Violin scroll shaking during vibrato.	Base of thumb tight.
First contact with the bow and string shaky.	Lack of springiness or feeling of "shock absorbers" in the bow fingers and thumb.
Playing looks and feels "constricted." Upper body movements appear large or awkward.	The middle of the back (the costal arch) is restricted, causing the upper body to rotate locked from shoulder to hip. Knees locked.
Working too hard to bow.	Shoulders contracted and raised up.
Lower back pain; student bending forward.	Knees locked. Upper back muscles pulling down.

Source: adapted from Simon Fischer, *The Violin Lesson*, (London: Peters Edition Limited, 2013), 192–195.

B. Maximizing improvement

Teachers can choose the intervention that will improve performance the most.[75] In *The Violin Lesson*, Fischer outlines a strategy for diagnosing errors where the violinist makes a list of

[74] Knudson, 125.

[75] Ibid., 128.

every musical and technical aspect that can be improved or addressed in the lesson and ranks them in the order of which aspect will most improve performance overall. He explains that violinists will progress more quickly when they address the top 1–3 areas first. Teachers and students can continually ask themselves what is the most important step to take next with themselves or their students.[76] Alternatively, Hay and Reid's two-step model recommends excluding errors related to previous actions and prioritizing the leftover errors that can be improved most in the time allowed. The difficulty lies in determining which factors cause both short and long-term improvements. Technique changes causing many short-term improvements may make it harder to progress at more advanced levels.[77] Similarly, Fischer believes progress is slower if you choose to work on elements lower on the list.[78]

C. Order of difficulty

Teachers can make the easiest corrections first, as long as those errors are unrelated or not important. This approach relies on positive reinforcement to motivate motor learning and practice and creates consistent, incremental improvements. However, easily communicated errors may not be the most important or improve performance.[79]

D. Correct sequences of movement

[76] Fischer, *The Violin Lesson*, xviii.

[77] Knudson, 128.

[78] Fischer, *The Violin Lesson*, xviii.

[79] Knudson, 128.

Teachers might choose interventions that follow movement sequences, such as the three phases of movement.[80] This approach has many benefits: it can help decide between similar interventions, teach children movements or improve their motor skills, improve preparatory movements, slow down movement sequences, and emphasize preparatory posture and the initial form before initiating the movement. However, there is little research supporting this rationale.[81] Violinists might prioritize these interventions if students have a coordination issue with the left and right hands or if they need to remediate a complex movement, like the hand and arm position while shifting up or down the bout.

E. Base of support

Teachers can begin with interventions targeting balance and the base of support before moving up the body.[82] This approach works well when technical issues can be linked to previous errors or chain-reactions originating in the lower body. Teachers can adapt the scanning strategies for observing the base of support described in section 4.1.2.1 for diagnosis.

F. Improve critical features first

This approach addresses critical features before examining overall form and style of movement. However, movements often have multiple critical features that may require different interventions. And, as stated before, critical features may differ between experts.[83] Violinists can diagnose critical feature interventions using Fischer's lens of proportions:

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[80] Knudson notes that Morrison and Harrison used this approach to teach QMD to classroom teachers without backgrounds in kinesiology in 1985. See Knudson, 128.

[81] Knudson, 128.

[82] Ibid., 129.

[83] Ibid., 129.

> The process of finding the right proportions—e.g. to find the best position of the left or right hand—is a matter of asking simple questions: should the hand be higher, should it be lower; should it be more to the left, more to the right, more curved, less curved, more on the tip of the finger, more on the pad, and so on. Whatever looks balanced and feels comfortable is likely to be the correct position.[84]

Fischer asserts that the teacher will never run out of solutions by asking "how much" the student should adjust a specific body part or technical component. In *The Violin Lesson*, he includes a list of targeted areas and critical features to look at in terms of proportions, such as whether the jaw should be heavier or lighter on the chin rest, whether the first finger should contact the neck of violin at a higher or lower point, or if the left forearm should rotate more or less to adjust the angle and height of the hand frame.[85]

Knudson acknowledges there is no consistent rationale for movement technique diagnoses in kinesiology. This may be because of limited research on diagnosis (although errors may appear obvious due to their divergence from an ideal form, the frequency and variability of errors is hard to account for even in the early stages of motor learning), instructor difficulties identifying and ranking critical features, and a mistaken belief that QMD is easy to learn through experience alone.[86] The criteria for determining the most effective intervention depend on the person and motor skill in question. Teachers should be patient with themselves when deciding which feedback is most important.[87]

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[84] Fischer, *The Violin Lesson*, 97.

[85] Ibid., 98–99.

[86] Knudson, 122–123.

[87] Ibid., 125.

4.2.4. Student Evaluation

Student feedback is an essential part of the observation and evaluation stages of QMD. Their kinesthetic feedback and mental assessment of performance provides valuable insights for evaluation and diagnosis. Kageyama recommends using the Post Event Reflection (PER)—an athletic tool designed by Graig Chow and Matteo Luzzeri—to teach musicians how to analyze their playing.[88] The PER is a tool designed to help athletes evaluate their performances through a combination of scaled rankings and open-ended journal prompts. Musicians can use the PER's open-ended journal prompts to help process their performances and find closure; use the scaled rankings to track their self-reported progress over time while performing, the strength and weaknesses of their mental skills, and other aspects of peak performance; and keep a record of other factors that positively or negatively affect performance for future reference. If students feel comfortable sharing some of this information with their teachers, it can help teachers determine when to teach peak performance skills, address performance anxiety, or help the student maintain an objective point of view.[89] For instance, a student may think they cannot play a certain piece well, or play in front of an audience without feeling nervous, but their teacher could ask them if their self-reported performance or mental skill scores have been steadily improving over time. If the student's self-reported mental skills scores have been decreasing lately, the teacher might consider addressing these aspects in the lesson.

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[88] Noa Kageyama, "'Post-Event Reflection': A Tool to Bounce Back Better and Faster from Sub-Par Performances," The Bulletproof Musician, accessed Feb. 23, 2021, https://bulletproofmusician.com/the-performance-post-mortem-a-review-process-to-bounce-back-better-and-faster/?hilite=%27Recording%27.

[89] Graig M. Chow and Matteo Luzzeri, "Post-Event Reflection: A Tool to Facilitate Self-Awareness, Self-Monitoring, and Self-Regulation in Athletes," *Journal of Sport Psychology in Action* 10, no. 2 (2019): 109–110, https://doi.org/10.1080/21520704.2018.1555565. Chow offers an online version of the PER upon request.

The PER process comprises five parts:

1. The student records when, where, and what kind of performance or practice occurred and rates their performance on a scale from 0 to 10 (where 0=poor, 5=acceptable, and 5=excellent.) This rating establishes a baseline regarding the student's assessment.[90]
2. The student reflects on their strengths and weaknesses, adjustments they made or want to make for future performance, and creates plans for incorporating the adjustments into their next sessions.[91] Use open-ended questions like "what worked well today?", "what did not work so well today?", and "what adjustments do I need to make?"[92] Review audio or visual recordings of the performance and use a performance rubric as needed.[93] Violin teachers could design a rubric or guide their students through a review of specific critical features for evaluation.
3. The student evaluates their mental skills and characteristics used while playing on a scale from 0 to 10 (where 0=low, 5=okay, and 10=high). This helps students identify which mental characteristics were strongest or weakest and the situations in which they arose. The teacher can work with the student to determine a list of mental skills tailored to the student's individual needs.[94] For example, Kageyama highlights the mental attributes of confidence and the ability to recover from minor mistakes.[95]

[90] Ibid., 110.

[91] Ibid., 111.

[92] Kageyama, "Post-Event Reflection."

[93] Ibid.

[94] Chow and Luzzeri, 111–112.

[95] Kageyama, "Post-Event Reflection."

4. The student reports their activation levels (whether they feel calm, excited, anxious, etc.) during warmups, and before and during performance. This helps students understand how their activation levels change.[96] One such scale that Kageyama uses ranges from "deep sleep" to "intense excitement," to reflect on how students managed their activation in order to replicate satisfactory results in the future.[97] This information can help determine if students need to work on peak performance skills.[98]
5. The student reflects on open-ended questions like "how well did you start and finish today?" (In order to identify differences in how the beginning and ending of the performance felt), "what did you learn about yourself today?", and "what did you do today to make your teammates better?" (Applicable when the student is working in a collaborative environment such as playing with a pianist or in a chamber-music setting.)[99]

Violin teachers can adapt the PER not only to teach students how to evaluate their playing in musical, physical, and mental areas during practice, but also use it as part of the QMD process during applied lessons. Guiding students through parts 2, 3, and 4 may assist teachers in determining whether performance errors are biomechanical, physiological, perceptual, or psychological.

Violin teachers can also foster peer evaluation skills during group or studio classes. Through peer assessment, students learn to critically evaluate their performance, learn more about self-evaluation through assessing their peers, and prepare to become future evaluators in

[96] Chow and Luzzeri, 112–113.

[97] Kageyama, "Post-Event Reflection."

[98] Chow and Luzzeri, 113.

[99] Ibid., 113.

some professional capacity like a teacher or adjudicator.[100] Teachers can create a nonjudgmental learning environment so that students feel safe practicing assessments during class. For more on fostering a student-centered teaching environment, see Social Learning Techniques and Community-Building.

Summary

Like athletics coaches and dance instructors, music teachers are "human movement detectives."[101] It is essential to help students and future violin teachers develop evaluative and diagnostic skills beyond detecting note and rhythmic errors in order to identify fundamental issues and determine the most important kinds of intervention. Incorporating more biomechanically informed critical features and movement principles into a sequential method of instruction helps violin teachers thoughtfully evaluate movement-based issues. Training students to objectively reflect on their playing provides essential information necessary for determining sources of performance errors. By learning about different rationales for diagnosing and prioritizing interventions, teachers become aware of their predominant approach and can experiment with alternative methods with different students and in various situations.

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[100] Diana Blom and Kim Poole, "Peer assessment of tertiary music performance: opportunities for understanding performance assessment and performing through experience and self-reflection," *British Journal of Music Education* 21, no. 1 (March 2004): 123, https://doi.org/10.1017/S0265051703005539.

[101] Knudson, 116.

Chapter Five: Methods of Intervention

Once a violin teacher makes a diagnosis, they move into the intervention stage where they administer "feedback, corrections, or other [changes] in the environment to improve performance and prevent or treat an injury."[1] In QMD, it is best to use only one type of intervention at a time to correct an error. QMD is a cyclical process—as shown in figure 1—so teachers can return to the observation and diagnostic evaluation stages after an intervention to determine its effectiveness and whether there is a need to try a different strategy. Violin teachers have many intervention tools available. This chapter discusses principles and suggestions for using six primary forms of intervention used in QMD: feedback, modeling, manual and mechanical guidance, training and conditioning, practice modifications, and attentional cueing.

Before exploring these interventions, it is beneficial to understand some basic principles of motor learning. Motor skills are learned when they can be repeated consistently without error under various conditions. In contrast, motor learning researchers identify non-permanent changes observed during practice as positive or negative **performance shifts**.[2] Positive performance shifts reflect short-term improvements.[3] A common example of positive performance shifts in music teaching is instantaneous improvements made during a masterclass with a guest teacher, which often disappear afterwards. Referring to this as masterclass syndrome, Helding emphasizes the student has experienced, rather than learned, a skill.[4] She hypothesizes that

[1] Knudson, 4–5.

[2] Helding, 103.

[3] Ibid., 107.

[4] Ibid., 103–104

"positive performance shifts are, at their most basic level, what students (and their parents) probably expect as a return on their investment in lessons."[5] In contrast, negative performance shifts describe short-term declines in performance. While some negative performance shifts are caused by poor physical or mental health or injury, others indicate unlearning is occurring. During the unlearning phase, a "new, learned skill is actively destabilizing an old, ingrained habit."[6] While unlearning old habits may make students feel vulnerable or upset, students must be encouraged to trust their teachers as they guide them through the learning process and create an environment of total focus in the practice room. Through practice, new motor skills become more stable.[7]

It is also important to be aware that students operate in two different modes—learning mode and performance mode. In learning mode, students can feel free to make mistakes and take risks while learning new skills. During performance mode, students strive to present well-prepared and polished performances. Sometimes, teachers and students expect near-perfect performances in music lessons when the student is still learning new skills or repertoire. However, Helding cautions that "learning suffers when we are not willing to seem silly, uncoordinated, or unmusical."[8] Learning mode is an excellent time to try different interventions

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Helding acknowledges students practicing immediately after the positive experience may memorize the effective intervention, especially if they are more advanced. But beginning students will be less able to connect what they've experienced with past learning.

[5] Ibid., 104.

[6] Ibid., 107–108.

[7] Ibid., 108.

[8] Helding, 101–102.

and encourage students to embrace an exploratory mindset. When students are in performance mode, Helding recommends teachers minimize their use of interventions.[9]

The Intervention Stage

5.1. Feedback

Feedback is simply "any and all information available to the learner."[10] Motor learning research identifies two main types of feedback: inherent (or intrinsic) feedback and augmented (or extrinsic) feedback.

5.1.1. Inherent Feedback

Inherent feedback (or **intrinsic feedback**) is kinesthetic and other sensory information drawn from the movement itself.[11] Musicians predominantly receive inherent feedback as visual, auditory, and proprioceptive information. Visual information, such as looking at the fingerboard for finger placement, is important in the beginning stages of learning an instrument. Intermediate and advanced students also use their vision to correct mistakes. Musicians rely on auditory information to evaluate pitch accuracy, intonation, tone, and other aural musical qualities. Auditory information comprises airborne sounds arriving in the performer's ear and room-reflected sounds that are altered by objects in the room like a carpet, indirectly arriving in the performer's ear.[12] While visual and auditory information are classified as exteroceptive—or outside the body—information, proprioceptive information comes from sense receptors within

[9] Ibid., 102.

[10] Ibid., 119.

[11] Knudson, 134.

[12] Helding, 121–123.

the body.[13] Helding explains that "our bodies must sense, then adjust in a continuous, 'open loop' of learning."[14]

5.1.2. Augmented Feedback

Augmented feedback (or **extrinsic feedback**) is information delivered from an external source, like a teacher or video recording. Examples of augmented feedback include praise, corrections, and specific information related to movement. Motor learning researchers agree verbal augmented feedback is the predominant form of intervention for motor skills instruction.[15]

Instructors use augmented feedback for three primary functions: information, reinforcement, and motivation. In every instructional setting, teachers face an important decision: does the situation call for more skill-related informational or reinforcement feedback or for more motivational feedback?[16]

Teachers use augmented feedback to convey pedagogical information explaining how to correct movement errors or how to plan the next movement response while practicing or learning the movement. Violinists should refrain from falling into the habit of repeatedly giving negative feedback (also known as a **correction complex**, which often occurs after multiple repetitions of an error) because it doesn't explain what the student should do and can create a discouraging

[13] Ibid., 120.

[14] Ibid.,129.

[15] Knudson, 134

[16] Ibid., 63.

environment. Instead, teachers can offer feedback in the form of nonjudgmental and specific cues.[17]

Teachers also use augmented feedback to reinforce technique. **Positive reinforcement** helps encourage successful aspects of technique, whereas **negative reinforcement** reduces the frequency of errors and unwanted actions. Begin augmented feedback by reinforcing positive aspects of performance identified during the evaluation stage. Knudson notes that negative reinforcement can address inappropriate or dangerous behavior and encourages teachers to follow with positive reinforcement, emphasizing good behavior or skill execution. However, too much negative reinforcement may affect the teacher's rapport with their student. For every negative reinforcement, use multiple positive reinforcements.[18]

Finally, teachers use augmented feedback that motivates students to practice. Motivational feedback should always be positive. It rewards consistent effort, promotes a positive attitude and atmosphere, and provides instruction in an encouraging way. Motivational feedback is an important tool for intervention with intermediate and advanced students, as Knudson notes that they are "often not motivated to make these difficult technique adjustments unless performance improves immediately, but performance usually suffers until the new motor pattern is learned."[19] Teachers can identify how a technique problem limits the student's performance to help them develop the personal motivation to make changes.[20]

A. Forms of augmented feedback

[17] Ibid., 135.

[18] Ibid., 135–136.

[19] Ibid., 136.

[20] Ibid., 136.

Motor learning classifies two forms of augmented feedback: Knowledge of Results and Knowledge of Performance. **Knowledge of Results** (KR) communicates information about the "outcome of the what the student just did."[21] **Knowledge of Performance** (KP) transmits information about the "movement or technique that led to the performance outcome."[22] KP is often considered the more important form of augmented feedback for QMD. However, Knudson notes that KR and KP can be the same when the goal is to move the body in a "perfect" way according to stylistic criteria (such as in dance and gymnastics). However, this depends on the discipline, situation, and environment.[23] For example, the goal of forming a bow hold is to achieve a specific aesthetic style. Some teachers may prefer to teach a bow hold used in the Franco-Belgian tradition of violin-playing, while others may prefer to teach a Russian or German-style bow hold.

Violin teachers often provide KR information in the form of musical score annotations and verbal feedback identifying performance errors such as shifting and intonation mistakes, incorrect fingerings, and tone evaluations. However, KR feedback should be communicated sparingly during lessons in comparison to KP.[24] Helding observes that expert music teachers use descriptive and prescriptive KP augmented feedback to explain what happened and how to fix it.[25] Violinists should consider using KP feedback when helping a student that struggles with a consistent technical problem such as general difficulties with shifting or intonation. After

[21] Helding, 135.

[22] Ibid., 136.

[23] Knudson, 137–138.

[24] Helding, 135.

[25] Helding, 136.

observing the student's arm movement during several shifts, for instance, the teacher can evaluate and diagnose any functional issues with the movement such as speed, arm angle, or finger/thumb pressure. KP feedback communicates that information to the student with suggestions for improvement.

B. Feedback timing

Augmented feedback can be given before, during, and after performance. Feedback offered before performance helps students focus on specific goals. It helps to provide music students a moment to visualize what they will play before giving them pre-performance directions. In contrast, **concurrent augmented feedback** is delivered during performance, often as verbal coaching, facial expressions, and hand signs.[26] Augmented feedback given after performance is known as **terminal augmented feedback**. Motor learning research separates terminal feedback into three subtypes: instantaneous, immediate, and delayed feedback. Teachers who give instantaneous feedback begin talking as soon as the student finishes performing, which can prevent the student from processing their inherent visual, auditory, and kinesthetic feedback.[27] In comparison, teachers who give immediate feedback wait a few seconds before providing verbal commentary. This brief delay helps students to better understand and communicate their kinesthetic experience with their teacher. Delayed feedback can also be given after larger amounts of time have passed, but the effectiveness of this feedback depends on how much time has passed and what has occurred during that interval. Distractions (also known as "filled feedback-delay intervals") delaying feedback can negatively affect learning as well.[28]

[26] Ibid., 131.

[27] Ibid., 133.

[28] Ibid., 133–134.

Masterclasses with respected pedagogues Mimi Zweig (https://youtu.be/qwlK-SaLixg?t=480) and Pinchas Zukerman (https://youtu.be/0A1gFKNCa3I?t=1081) illustrate that the timing of feedback can be important. Violinists usually offer instantaneous terminal feedback after the student performs or attempts a task. After a student, Alice, finishes playing a sonata by Handel in a group class, Zweig quickly offers praise before pivoting to a central theme of sustaining the bow between notes.[29] Similarly, Zukerman talks to violinist Chieri Tomi even before the applause following Tomi's rendition of Tchaikovsky's Violin Concerto concludes. Except for a brief statement at first telling Tomi to open up the angle of their violin and bow while playing to create a larger, more sustained sound, Zukerman's feedback overall does not support a general theme. Instead, he takes Tomi measure-by-measure through the first movement exposition, having them start and stop playing to fix every error.[30] In contrast, Zweig specifies a learning goal for Alice before having her try the opening of the first movement again. Zweig offers pre-performance feedback by asking Alice to "draw the bow slower and feel it connecting to the tip… so the sound connects between the notes." Zweig also offers instantaneous feedback after each attempt by Alice before changing the next trial's goal.[31]

Zukerman offers countless examples of concurrent augmented feedback working with Tomi. Although concurrent augmented feedback is more frequently used when students are trying out concepts with teachers post-performance, Zukerman gives feedback throughout Tomi's initial performance (13:07-17:54). He calls out "up" (to hold the violin up higher);

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[29] Mimi Zweig, "Lessons with Alice – Handel F Major Sonata," Jan. 31, 2021, video, https://youtu.be/qwlK-SaLixg?t=480.

[30] National Arts Centre | Centre national des Arts, "Pinchas Zukerman: Violin/Viola Masterclass 2014," Nov. 15, 2014, video, https://youtu.be/0A1gFKNCa3I?t=1081.

[31] Zweig, "Lessons with Alice."

"nose" (to look at the fingerboard); various instructions dealing with the bow and sound like "bow," "save," "deep sound," "chocolate," and "let's float;" and praise like "yes" and "good." Zukerman also makes gestures such as alternating between tapping an imaginary fingerboard and his nose to draw attention to the fingerboard, lifts his left arm to imitate holding the violin up, and air-bowing to simulate sustained bow strokes. Noticeably, Zukerman gets up multiple times and stands close to Tomi while they perform, gesturing, speaking, and even snapping his fingers.[32] In comparison, Zweig remains silent and takes notes while Alice performs.[33]

Violin teachers should be wary of giving too much concurrent augmented feedback, which should be used minimally because it cannot express the same sensory information that is kinesthetically felt, and tends to be processed differently from person to person. Concurrent augmented feedback may also cause short-term performance shifts instead of lasting changes. Similarly, Helding cautions that instantaneous feedback leaves little time for the student to reflect on how they played and "scripts for the learner what he *should* have felt instead of allowing him to work out for himself what he *did* feel."[34]

C. Feedback guidelines

Violinists can follow Knudson's seven guidelines for administering augmented feedback.

i. Be judicious

Teachers can make a common mistake by giving too much feedback at once, or they may have a correction complex. This makes it challenging for students to plan future attempts to try

[32] National Arts Centre | Centre national des Arts.

[33] Zweig, "Lessons with Alice."

[34] Helding, 131–133.

the movement and can lead to over-analyzing, especially under performance pressure. It helps to choose one intervention to focus on in the diagnosis stage.[35]

ii. Be specific

Teachers can customize individualized feedback for each student, considering the student's age, stress level, comprehension, personality, body language, interactions with others, and learning style. For example, visual learners work best with images and diagrams, auditory learners with verbal cues, and kinesthetic learners with manual guidance and small amounts of verbal feedback.[36] Helding argues that "if you prioritize a concern for how your student learns over how much you yourself know, your feedback is bound to be more nuanced and fruitful."[37]

iii. Give almost immediate feedback

Providing **immediate feedback** right after the student performs helps them relate the augmented feedback to what they experienced kinesthetically through their proprioceptive senses and muscle memory. Give students a minimum of five seconds to process and compare feedback to their experience.[38] Likewise, Helding considers immediate feedback to be the most effective form of terminal feedback.[39] Knudson also doesn't believe **instantaneous feedback** is as necessary in QMD.[40]

iv. Keep feedback positive

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[35] Knudson, 139.

[36] Ibid., 140.

[37] Helding, 137.

[38] Knudson, 140–141.

[39] Helding, 133.

[40] Knudson, 141.

Most feedback recommended in physical education and music education research is categorized as "negative" feedback—meaning the teacher is asking the student to *not* do something (e.g. "do not shift so quickly.") As discussed above, negative feedback can be occasionally useful, but not as the primary tool for intervention. Knudson stresses that a "good QMD focuses on the qualities of a skill and not just on errors."[41] Positive feedback builds self-confidence, provides direction without negativity, and motivates students to practice. It focuses on strengths first before addressing weaknesses, which helps students reinforce good habits.[42]

v. Provide frequent feedback

For beginners, it helps to provide more frequent feedback early in the motor learning process and in large classes where every student needs to receive some individual feedback. In one-on-one instruction, teachers can use the **faded reinforcement principle** to provide more frequent feedback early on and less feedback as the skill improves. With more advanced learners, teachers should involve the student more in the evaluation and diagnosis stage. Students should "rely more on kinesthetic and proprioceptive intrinsic feedback than on the augmented feedback from the teacher."[43] This problem-solving strategy—known as **summary feedback** in motor learning research—lets the intermediate or advanced student try different processes or solutions a few times to figure out which is the most effective for them before the teacher offers feedback. Alternatively, some teachers may prefer to only provide feedback when the student is struggling with a concept—meaning they will not offer frequent praise when the student successfully performs skills. This strategy is known as **bandwidth feedback** in motor learning research.

[41] Ibid., 141–142.

[42] Ibid., 142.

[43] Ibid., 142.

Before using bandwidth feedback with new students, teachers can check in with students and their parent/guardian first to find out if the student is used to receiving frequent praise during lessons, and if so, explain when and why they might use bandwidth feedback during a lesson instead. Bandwidth feedback is most effective when the teacher and student agree ahead of time to use this strategy.[44]

vi. Use cue words or phrases

Knudson highlights dance instruction as an example of effective feedback using cues**.** Dance teachers use cues timed to music, short cues, and nonverbal cues in class.[45] An extensive introduction to cueing can be found in Chapter 6.

vii. Use a variety of approaches

Feedback is most effective using age-appropriate imagery and cues fitting different learning styles. To tell if a cue or feedback is working, ask the student questions for comprehension or have them repeat or rephrase feedback.[46] However, too much feedback can harm learning overall, as students can become dependent on feedback or addicted to praise. Excessive feedback prevents learners from processing their inherent feedback and even causes cognitive overload.[47]

[44] Helding, 134–135.

[45] Knudson, 143.

[46] Ibid., 143.

[47] Helding, 136–137.

5.2. Modeling

Modeling, or observational learning, provides visual and auditory information through demonstrations or images.[48] String teachers often model examples of good and poor left and right-hand technique, tone, phrasing, articulation, and stylistic elements. Beginners and visual learners especially benefit from modeling.[49] McAllister argues that music teachers rely on verbal instruction too much, which can overwhelm beginners, be interpreted in several ways, and takes longer for students to understand. Students grasp visual and auditory models quickly because of simultaneous and sympathetic processing. Simultaneous processing activates automatic processes in the brain, such as when the brain activates muscle processes while watching a concert or sports match. The kinesthetic experience of what you see is called a "sympathetic process," which allows the brain to integrate movement patterns more effectively.[50] Similarly, Haston connects modeling to implicit learning, where students subconsciously draw on pre-existing knowledge without relying on verbal explanations of the concept.[51]

Modeling is an effective way to help students learn new movement patterns or skills.[52] However, modeling is not the best option for intervention when the goal is to improve motor control or when refining or customizing movement on a situational basis. Some music teachers are also concerned that too much modeling leads to rote teaching without conceptual

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[48] Knudson, 145–146.

[49] Knudson, 145–146.

[50] McAllister, *The Balanced Musician*, 79–81.

[51] Warren Haston, "Teaching Modeling as an Effective Teaching Strategy," *Music Educators Journal* 93, no. 4 (March 2007): 26, https://doi.org/10.1177%2F002743210709300414.

[52] Knudson, 145.

understanding, especially when working with children, beginning-level students, or when learning a new skill.[53] For example, Yehudi Menuhin was highly skilled at **mimesis**—the ability to imitate exactly what someone demonstrates—as a child.[54] Menuhin explains that his principle teacher Louis Persinger "demonstrated and I imitated, winning achievement by ear without detour through the conscious mind."[55] As discussed in Chapter One, Menuhin lost his intuitive ease with the violin as an adult and eventually recognized how little he consciously understood the mechanics of violin-playing.[56] Modeling without clearly establishing a conceptual understanding of the physical aspects of playing may lead to students developing unconscious and harmful habits and technique.

So, how can teachers safely and effectively model concepts? One way is to use aural modeling combined with a dialogic teaching approach—asking guided questions—to teach musical expressiveness to children facilitates deeper conceptual understanding. Helping students "reflect on what they hear in an aural model and how this relates to their interpretation" makes it easier for children to process complex information in aural models.[57] McAllister recommends that teachers alternate between brief discussions, modeling, and student imitation and

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[53] Haston, 29.
This is a familiar argument among violin teachers when debating the introduction of note reading for Suzuki Method students.

[54] Terry Teachout, "The Riddle of Yehudi Menuhin," *Commentary* 111, no. 6 (June 2001): 53. https://www.commentarymagazine.com/articles/terry-teachout/the-riddle-of-yehudi-menuhin/.

[55] Menuhin, *Unfinished Journey*, 32.

[56] Ibid., 260-261.

[57] Henrique Meissner and Rene Timmers, "Young Musicians' Learning of Expressive Performance: The Importance of Dialogic Teaching and Modeling," *Frontiers in Education* (Feb. 18, 2020): 1–21, https://doi.org/10.3389/feduc.2020.00011.

experimentation, spending no more than 5 minutes per segment.[58] Modeling is more effective when teachers direct their students' focus to specific elements of the demonstration and make sure they understand why the modeled behavior is beneficial or important. It is important to set up a system for students in order to remember models easily, be it a practice journal, recordings, or notes.[59] Teachers can use McAllister's tactics for incorporating modeling in different ways:

1. Demonstrate/sing how the student played, then demonstrate/sing how the music should sound.
2. Demonstrate various possibilities and have the student pick their favorite.
3. Have students identify the differences between two modeled examples.
4. Exaggerate differences to help students develope more refined observational skills.
5. Between repetitions, identify what needs to change and how the student can technically or musically achieve that.[60]

While McAllister focuses primarily on auditory models, these suggestions can work with visual/physical models of technique and movement as well.

Violinists can also use modeling effectively in their own practice. One approach is to observe great players in concert or through a video platform like YouTube and trying out what they were doing in the practice room. Engaging in sympathetic processing, pretend you are in the performer's body to kinesthetically imagine playing along with them. Students can also listen to recordings to imitate different sounds and styles.[61]

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[58] McAllister, *The Balanced Musician*, 79.

[59] Ibid., 82–83.

[60] Ibid., 79–80.

[61] Ibid., 81–84.

5.3. Teacher Assistance

During lessons, teachers may need to intervene with physical actions, known as "manual or mechanical guidance".

5.3.1. Manual Guidance

Manual guidance (or **manipulation**) describes holding or moving a student's body into specific positions to make it easier for them to kinesthetically feel the movement.[62] Zweig attests that "a critical skill in string teaching is the teacher's ability to manipulate and mold both hands of the student."[63] Likewise, Rolland argues that manual guidance is an essential part of remedial work. He elaborates that a "student, if handicapped by ingrained faulty habits, is often unable to make correct movements in spite of his best intentions or the most exacting and clear explanations of his teacher. The sensitive and helping hands of the teacher can often make the student realize and sense what is wanted, more so than rational explanations."[64]

Pedagogical materials for teaching beginning and remedial violinists regularly suggest using manual guidance for the following areas:

1. **Learning to hold the violin while maintaining good alignment.** To help the student feel balanced around the center of the body while holding the violin, Zweig suggests having the students form a circle with their hands on top of each other in front of the

[62] Knudson, 149.

[63] Mimi Zweig, "Part 5: The Violin and Bow Together," String Pedagogy.com, accessed Feb. 8, 2021, http://www.stringpedagogy.com/members/?submit=START&hsCtaTracking=f34afb6f-30ca-4f0c-a7e5-04e6f79284e8%7C7c53da2c-bab4-4805-9ff9-640ad8ceec9b.

[64] Rolland, 181.

body and open the arms to violin playing position so that the teacher can place the violin on the collarbone.[65]

2. **Developing a "flexible and dynamic stance."**[66] To encourage students to develop posture and a stance that is healthy and balanced, Rolland suggests the teacher move the scroll while the student is in playing position (without the bow) to ensure the student flexibly transfers their weight between the feet.[67]
3. **Encourage relaxed shoulder and neck muscles.** Kempter recommends teachers hold the student's left elbow and guide it from side to side to show the elbow's range of motion.[68] Similarly, before introducing vibrato, Rolland suggests having a teacher or a fellow student swing the student's left arm while in playing position to model the feeling of arm and shoulder relaxation.[69] Rolland also tests students often for shoulder tension by placing a hand on the student's shoulder close to the neck, gently releasing arm weight onto the shoulder, and swinging the student's elbows. He explains that elbow mobility indicates shoulder relaxation, and that teachers should look for the right elbow "'floating' up and down" and the left elbow swinging left and right.[70]

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[65] Mimi Zweig, "Part 2: Getting The Student Ready: The Physical Set-up," String Pedagogy.com, accessed Feb. 8, 2021, http://www.stringpedagogy.com/members/?submit=START&hsCtaTracking=f34afb6f-30ca-4f0c-a7e5-04e6f79284e8%7C7c53da2c-bab4-4805-9ff9-640ad8ceec9b.

[66] Rolland, 181.

[67] Ibid., 68.

[68] Kempter, 36.

[69] Rolland, 153.

[70] Ibid., 181.

4. **Introducing or rehabilitating the bow hold.** Zweig instructs teachers to help "the student experience the feeling that the right arm is relaxed, can feel its own weight, yet it is supported. The student's right elbow should feel loose and heavy in the teacher's hand. With the teacher's help, the student learns to find the ideal balance."[71] Zweig further explains that the teacher should scoop up the student's right hand onto a pencil and shape the fingers into the beginning bow hold.[72] If the student struggles with a rigid bow hold, Rolland suggests showing them what a soft bow hold feels like by demonstrating a bow hold on their hand, with the student's hand serving as the bow.[73]
5. **Putting the violin and bow together for the first time.** Zweig believes in the first lessons with the violin and bow together, the teacher must help the student bow in order to develop good bowing habits and teach the parent how to guide their child's bow in practice at home.[74]

Manual guidance is helpful for beginners and low-skill levels and for students comfortable with teacher-student contact.[75] However, Helding believes hands-off manual guidance is the best approach in lessons. She warns that the one-on-one nature of applied music lessons, which is often the case when working with older adolescent and adult students, is ripe

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[71] Mimi Zweig, "Part 4: The Bow," String Pedagogy.com, accessed Feb. 8, 2021, http://www.stringpedagogy.com/members/?submit=START&hsCtaTracking=f34afb6f-30ca-4f0c-a7e5-04e6f79284e8%7C7c53da2c-bab4-4805-9ff9-640ad8ceec9b.

[72] Ibid.

[73] Rolland, 181.

[74] Zweig, "Part 5: The Violin and Bow Together."

[75] Knudson, 149.

for "misunderstanding, misuse, or outright abuse…" when using manual guidance.[76] Asking for student consent is "not sufficiently comprehensive" because some students—especially young students—may feel pressured to say "yes," or not know how to say "no." Because manual guidance is an effective intervention, Helding recommends teachers demonstrate on their own body and guide the student to mirror them, or send students home with written cues describing specific directions and desired sensations to practice.[77] But this requires the teacher to have a thorough understanding of biomechanics and cues tailored to different learning styles to prevent the student from anatomically misinterpreting their directions. It should also be noted that Helding's specialization is in vocal pedagogy, where the body *is* the instrument and therefore especially vulnerable during manual guidance. Many vocal teachers prefer to wait to start beginning students until their vocal cords are more developed, often between the ages of 13–15.[78] Violin teachers often work with beginning students as young as 2–4 years-old who are still developing key motor and cognitive skills and may require more manual guidance. Violinists should consider both the ethics of manual guidance and the developmental needs of the student. Helding insists that students must know they have the "fundamental human right to forbid touching" and suggests that students send emails stating their preferences for the use of physical touch during lessons.[79] With young students, teachers can work with the student's

[76] Helding, 137–138.

[77] Ibid., 138.

[78] Ellen Rosner Feig, "Voice Lessons: When Your Child Should Start," NY Metro Parents, Aug. 23, 2016, https://www.nymetroparents.com/article/Voice-lessonsWhen-Your-Child-Should-Start.

[79] Helding, 138.

parent/guardian and the student to establish clear lines of communication, boundaries, and consent when using manual guidance.

5.3.2. Mechanical Guidance

Mechanical guidance refers to devices or teaching aids that help approximate the correct movement.[80] Mechanical guidance helps "learners use proprioception (feeling) rather than verbal cues to get the knack of unfamiliarity physical positions."[81] Teaching aids and props help engage student's imaginations when modeling or verbal explanations aren't effective.[82]

A. Traditional use of teaching aids

Violin teachers regularly use teaching aids and props to introduce or remediate setup and the fundamental movements involved in left and right-hand technique. Although most classic and advanced violin treatises don't mention any examples of props or teaching aids, Menuhin advised starting bow holds on a wooden stick.[83] Rolland expands on this idea by using a pencil or dowel to teach the bow hold and a cardboard roll to practice the bowing motion.[84] Notably, Rolland drew from his work as project director of the University of Illinois String Research Project, which taught many violinists in group classes.[85] Group class teachers have less time

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[80] Knudson, 149.

[81] Helding, 104.

[82] Laurie Niles, "Teaching with Pedagogical Props from your Local Store—ASTA 2015," Violinist.com, March 23, 2015, https://www.violinist.com/blog/laurie/20153/16674/.

[83] Menuhin, *Violin*, 32.

[84] Rolland, 80.

[85] Ibid., 1.

available to give individual feedback on setup to students, so they often rely on mechanical guidance to help students establish and maintain their left and right hand positions and setup.[86]

Many modern pedagogical resources like Zweig's StringPedagogy.com, Thompson-Robinow's *The Embodied Violinist*, and Kempter's *How Muscles Learn: Teaching the Violin with the Body in Mind* adopt Rolland's teaching aids and offer many other forms of mechanical guidance. Another helpful resource is Cynthia Reynold's "The String Teacher's Toolbox: An Investigation of the Use of Teaching Aids to Develop Left and Right Hand Setup in Beginning String Students," which contains an extensive list of homemade and commercial props and teaching aids used to establish, reinforce, or remediate left and right-hand setup.[87]

B. Teaching aids for improving alignment and fundamental movements

To build arm strength and improve posture, students can hold their case in front of them like a tray while marching to music and practice lifting the case over their head.[88] Balance a small rubber ball or ping-pong ball on the G and D strings close to the bridge to develop an understanding of the correct violin angle and height in playing position.[89] Kempter recommends creating a "plumb bob," a long piece of heavy string with an object tied at the bottom, to check students' spinal alignment without violins, with the violin and bow in playing posture, and while playing.[90]

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[86] Cynthia Reynolds, "The String Teacher's Toolbox: An Investigation of the Use of Teaching Aids to Develop Left and Right Hand Set-Up in Beginning String Students" (master's thesis, The University of the Arts, 2017): 1, ProQuest Dissertations & Theses Global.

[87] See Reynolds, 133.

[88] Rolland, 69.

[89] Ibid., 71.

[90] Kempter, 30.

To build dexterity in the hands—especially the pinky fingers—young students can pick up small objects and drop them in a bowl and pass a tissue around in group classes with one finger and the thumb, alternating fingers each time. To build strength, students can also crumple a sheet of newspaper into their palm using only one hand at a time (use a quarter or half-sheet of newspaper for young students).[91] Alternatively, encourage students to open doors and pick up everyday household items like keys, books, and other objects with an awareness of how they use their right hand and arm in order to help them understand the active, passive, contracting, or relaxing muscle movements involved in bowing.[92] To illustrate the importance of the left elbow's range of motion, place a candy roll—a Life Saver-type roll for larger hands or a Tootsie Roll for smaller hands—in the student's left hand in playing position and has the student practice centering the roll over each string by moving the elbow.[93] To develop the basic arm motion involved in shifting and vibrato, students can glide their left hand back and forth with a tissue placed between the fingers and the string.[94]

More experienced teachers are more likely to use teaching aids for both the right and left hands.[95] However, teachers who do not use teaching aids believe they are not effective, take too much instructional time to implement, are too expensive, or time-consuming if making them at

[91] Ibid., 45–46.

[92] Thompson-Robinow, 40–41.

[93] Kempter, 36.

[94] Ibid., 90.

[95] Reynolds, 67.

home.[96] Some teachers prefer to use verbal cues and symbolism or to teach skills incrementally.[97] Others prefer using manual guidance or mirrors (visual feedback).[98]

C. Issues with guidance

Mechanical guidance might increase risk of injury.[99] For instance, Kempter advises teachers to be on the lookout for students angling their heads to look at fingerboard tapes, which can lead to overuse and other musculoskeletal injuries. She explains that students are often told by teachers to watch their fingerboard tapes. The teachers must later correct students' posture by instructing them to not let their head fall to the side. Teachers can look for relaxed, well-aligned shoulder and neck muscles, but should also reassure students they will become more accustomed to relying on their ears rather than looking at the tapes.[100] Likewise, violin educator Barbara Barber believes foot charts—where the teacher traces the student's feet onto a paper bag or mat to designate the violin stance—cause students to stiffen up while playing because they believe they must keep their feet stuck in one position. An alternative to the foot chart is a "taped-off 'performance square'" to facilitate natural movement.[101]

Motor learning research raises some concern with both manual and mechanical guidance. Students may experience difficulties unlearning old muscle memory and in transferring new

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[96] Ibid., 71.

[97] Ibid., 47.

[98] Ibid., 55.

[99] Knudson, 149–150.

[100] Kempter, 24.

[101] Laurie Niles, "Barbara Barber: Good Spiccato Starts in the Bow Hand," Violinist.com, Dec. 16, 2010, https://www.violinist.com/blog/laurie/201012/11903/.

kinesthetic feelings into the actual movement in practice.[102] Helding asserts that manual and mechanical guidance are examples of positive short-term performance shifts that can actually harm learning over time. She references the guidance hypothesis in motor learning theory, which states that "feedback in which the learner is physically guided (e.g. hands-on manipulation) or that strongly blocks error from occurring can actually harm learning if it makes learning too easy."[103] Helding points to the debate over using mechanical help for bowing such as "bow helpers" or "bow buddies." Some string teachers rave about bow helpers because they help beginning and remedial students progress faster and be able to focus on other concepts. However, other teachers believe that bow helpers and other mechanical guides like fingerboard tapes don't address individual students' learning needs and make students dependent on them.[104]

Motor skills can only be considered learned when the student can perform at the desired level without the guide.[105] But Helding acknowledges that "anecdotal evidence does suggest that the immediate benefit from manipulation techniques may be retained if they are not used routinely or for very long."[106] For example, Reynolds' survey found that some teachers removed all finger tapes except for the third-finger tape as students' aural skills develop and then used the third-finger tape to help teach shifting into third position, which is often the next position taught

[102] Knudson, 149.

[103] Helding, 104–106.

[104] Ibid., 105.

[105] Ibid., 104.

[106] Ibid., 132.

in violin pedagogy.[107] It is important for teachers to remember that manual and mechanical guidance are temporary tools and to foster student independence playing without guidance.

5.4. Training and Conditioning

Students may require interventions related to their overall health and physical ability to play the instrument. Interventions dealing with training and conditioning address issues either with strength or flexibility. Strength interventions include strength/conditioning programs and equipment modifications. Flexibility interventions primarily involve stretching.[108] Although Knudson approaches training and conditioning interventions from an athletic coaching perspective, they parallel interventions for performance-related musculoskeletal injuries. The following sections discuss violin and musician-specific applications of these interventions.

5.4.1. Strength and Conditioning Programs

Strength and conditioning activities help address unhealthy muscle imbalances. Underused muscles like the back and shoulder muscles need to be strengthened to help support overused muscles like arm muscles.[109] Paull and Harrison outline three exercise protocols for musicians:

1. Choose exercises and activities that address the whole body first and then specific body parts for playing.
2. Familiarize oneself with the definitions and functions of various aspects of exercise when designing a program.

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[107] Reynolds, 45.

[108] Knudson, 150.

[109] Horvath, 100.

3. Maintaining a regular fitness routine helps keep the body healthy, counteract fatigue, and prevent injuries.[110]

A successful training program has exercises that improve posture and focus on instrument-specific demands, monitoring postural problems throughout daily life, and correcting bad habits while practicing.[111] In order to identify areas of the body to strengthen, violinists can stand in front of a mirror and go through a checklist of common misalignments such as those identified by Türk-Espitalier.[112]

Good body awareness is necessary to detect tension and to strengthen muscles safely and effectively.[113] Franklin warns that "unless strength is built into an efficient movement pattern, it can potentially do more harm than good for controlling movement… If you train the muscles consciously, you will achieve your technical *and* aesthetic goals and you will make long-term changes, creating more efficient movement patterns that also reduce the chance of injury."[114] As such, Franklin advocates for using the mind-body connection—specifically mentally simulated movement with vivid imagery—to strength train with "consciousness and specificity."[115]

Violinists have many options for strengthening and conditioning. Paull and Harrison provide recommendations and sample schedules for daily fitness and cross-training in *The*

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[110] Paull and Harrison, 110.

[111] Alexandra Türk-Espitalier, *Musicians in Motion: 100 Exercises With or Without Instrument*, trans. Alexandra Türk-Espitalier and Christine Wendel (Frankfurt, Germany: Musikverlag Zimmerman, 2016), 7.

[112] Ibid., 14.

[113] Ibid., 114.

[114] Eric Franklin, *Conditioning for Dance*, 2nd ed. (Champaign, IL: Human Kinetics, 2004), 23.

[115] Ibid., 23–24.

Athletic Musician.[116] Janet Horvath suggests swimming or isometric exercises using a resistance band to strengthen the body. She cautions musicians to avoid heavy weightlifting, gripping, and pulley exercises.[117] However, Angela McCuiston, a flautist and Certified Personal Trainer and Exercise Specialist, believes weightlifting can be both beneficial and safe when working with an accredited personal trainer who performs movement assessments and assigns targeted exercises addressing the musician's specific needs and goals. She dismisses concerns from string professionals like Horvath that string players automatically will gain too much mass in the chest and shoulder area, lose finger dexterity, or develop unwanted calluses. McCuiston explains that weight training does not immediately lead to increased size and mass. How musicians train, what their training goals are, and their consistency in training determines the outcome. Similarly, musicians will not automatically lose finger dexterity by training different kinds of muscles than those used while playing, and improved grip strength can actually support elbow and shoulder joint health. If string players are concerned about calluses or gripping the bar, McCuiston advises wearing weightlifting gloves and using lifting hooks.[118]

One resource that musicians can use to help design their own physical training programs is Türk-Espitalier's *Musicians in Motion: 100 Exercises With and Without the Instrument*. She shares four kinds of exercises—mobilization, strengthening, stretching, and coordination exercises—for each body area and for warming-up, cooling down, breathing, and standing and sitting. Türk-Espitalier provides careful instructions for each exercise, sample practice schedules

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[116] Paull and Horvath, 134–136.

[117] Horvath, 100.

[118] Angela McCuiston, "Debunking Weightlifting Myths for the Musician," Corpßonore, Sept. 9, 2019, https://www.corpsonore.com/movement-blog/2019/9/6/debunking-weightlifting-myths-for-the-musician.

incorporating exercises during rest periods, and training programs targeting individual goals like improving core stability. She suggests that violinists focus on neck mobilization and stretching; shoulder mobilization, strengthening, stretching and coordination; forearm stretching; and wrist mobilization. Violinists with round backs can focus primarily on exercises for upright posture, the shoulder, and the neck, while violinists with flat backs should work on mobilizing the chest, upper back, and shoulder areas.[119] Türk-Espitalier also introduces an invaluable list of musical goals and instrumental techniques corresponding with an awareness of specific body areas. For example, violinists interested in refining their deep breathing and musical phrasing can investigate the length of their lower spine, look to open the hip joints, and stabilize the torso and pelvis.[120]

5.4.2. Equipment Modifications

Postural and movement problems may require equipment modifications. First, the violinist or teacher must perform an ergonomic evaluation. The following evaluation described by Paull and Harrison in *The Athletic Musician* can be performed by a healthy violinist on their own, but injured players should work with an expert like a physiotherapist because an "ideal posture for someone without injuries may be out of the question for a hurt player, and efforts to change equipment to achieve a postural ideal may end up making you worse."[121]

1. To prepare for the evaluation, establish its focus. Is it focused on the performer and their alignment, or on the instrument and its setup? Determine whether a colleague, teacher, or

[119] Türk-Espitalier, 130–131.

[120] Ibid., 104.

[121] Paull and Harrison, 99.

physiotherapist's help is required. Set up any additional materials like a video recorder or three-way mirror for observation.

2. The first part of the evaluation involves determining "athletic posture," the playing posture without the instrument. Critical features to look for include:
    a. From the posterior (back) view: square shoulders; neutral spine.
    b. From the anterior (front) view: nose medially centered.
    c. From the lateral (side) view: note if the performer shows a healthy range of neck retraction, and the ears are positioned over the shoulders.
3. After the performer plays a short, comfortable excerpt, compare the athletic posture to the playing posture with the instrument. Notice:
    a. What has changed from the athletic posture?
    b. How is the body adapting to the instrument?
    c. Have any joints moved from a neutral position or range of motion?[122]

Alternatively, have student freeze in the middle of playing and take away their violin so they can see what their posture looks like while playing.[123] This evaluation is similar to the observation and evaluation stages of the QMD model. Teachers can walk students, especially those considering careers in music, through this process so they feel comfortable conducting evaluations on their own in the future.

Once the initial evaluation is complete, the violinist or teacher must decide on an ergonomic modification. Paull and Harrison admit this process requires experimentation, especially with setup. Two general physiotherapy principles to follow:

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[122] Ibid., 99–101.

[123] Fischer, *The Violin Lesson*, 204.

1. Ergonomic adaptations can be considered successful if the musicians' posture becomes closer to anatomically correct alignment with neutrally positioned joints.
2. Ergonomic modifications must not compromise the instrument's tone.[124]

Paull and Harrison argue that "any change to playing, even a change that makes it easier to play, must not involve a major revamping of technique."[125] However, violinists changing from playing with a shoulder rest to playing without one (or a different support like a small sponge) may have to change their technique because of the way the body supports the instrument changes. A better guiding principle might be to time any drastic changes so that they do not coincide with significant periods of performance, and so the performer has time to become accustomed to any changes in technique.

Violin teachers usually recommend two kinds of equipment modification: instrument size and setup.

A. Instrument size

Instruments that are too heavy, wide, or long can cause upper body tension, muscle strain, and postural issues especially with younger students. A key critical feature to look for is if the student's left arm presses against the body, causing the violin to droop. This means the student must uncomfortably extend their left arm to hold up a violin that is too long or too heavy. Violin teachers often size instruments using a variety of non-scientific approaches. Some teachers make sure students can wrap their hand comfortably around the scroll of the violin. Others, like Kempter, give students a watchband to wear and make sure the scroll can rest on the student's

[124] Paull and Harrison, 98.

[125] Ibid., 98.

extended arm just inside the watchband.[126] Many violin suppliers instruct teachers and parents to measure from the student's neck to the center of the palm and compare the measurement to a chart with arm measurements corresponding with instrument sizes.[127] It can be helpful to double-check instrument sizes using multiple methods.[128] Kempter also draws attention to the width of the lower bout of the violin, noting that if the lower bout "protrudes over the back of the left shoulder, or over the sternum," it can impede the student's left-arm movement while playing.[129]

B. Setup

Chin rests and shoulder supports play an integral part in alignment, posture, and injury prevention for violinists. Two critical features for alignment regardless of setup include the neutral positions of the left shoulder (not raised) and the head and chin (not lowered down and to the side).[130] Over 47 percent of violinists use chin rests improperly, and less than 10 percent of violinists actually require a chin rest that goes across the tailpiece as opposed to a center-mounted chin rest. Critical features to look for with the chin rest include:

1. The head is not pushed forward.
2. The head and neck are not rotated.

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[126] Kempter, 18–21.

[127] "How to Determine the Proper Instrument Size," Shar Music, accessed Feb. 11, 2021, https://www.sharmusic.com/Pages/How-To/Measure-Your-Child/.

[128] Some adults and teenagers have smaller-than-average hands and may struggle to play with a full-size violin. They may find a 7/8 violin (sometimes sold as a "lady's violin") more comfortable. As these sizes are more rare, Consordini Musical Instruments recommends working with your local violin shop or luthier to find one. See "Violin Sizes: finding Your Fit," Consordini Musical Instruments, last modified Dec. 22, 2020, https://consordini.com/violin-sizes-finding-your-fit/.

[129] Kempter, 22.

[130] Horvath, 159.

3. The jaw does not sit on the uncomfortable ridges of the chin rest.
4. The violin has not moved too forward and down on the body.

Horvath recommends using the jaw length and shape to determine the type of chin rest and to add lifts in 5 mm increments to fill in the space between the violin and the jaw.[131] She suggests the following principles for experimentation:

1. Don't experiment while injured to avoid making the condition worse.
2. Look at the effect on whole body by using mirror or have someone evaluate you from behind.
3. Stand against a wall to see if the chin rest affects neutral posture negatively.[132]

Setup educator Lynne Denig advises visiting a violin shop and trying out many types of chin rest shapes. She cautions against buying chin rests online without extensive experimentation because different manufacturers may produce the same model of chin rest but have slightly different shapes and height. While she acknowledges everyone has differently shaped jaws, Denig offers some general suggestions for finding a comfortable chin rest:

1. "Round, fleshy jaws are the only ones suited to a flat plate and a long, low ridge across the back of the chin rest. Rests with a higher ridge are favored by players with a long, thin face, while the Brandt model is a comfortable fit for a variety of jaw shapes;"

[131] Ibid., 159.
Frisch and Denig offer chin rest fitting kits for small and regular-to-tall neck lengths and children with 5–10 different chin rest toppers, although they recommend working with an approved fitter or movement professional to determine the best fit. See "Fitting Kits," Frisch and Denig Violin and Viola Chinrest Fitting System, accessed Feb. 11, 2021, https://www.chinrests.com/store/Fitting-Kits-c31520238. Violin teacher Heather Ensley recommends using adhesive cork to add lifts as an inexpensive alternative to professional wood lifts. Kempter also notes that chin rests can be sanded "to remove large bumps or to reduce length slightly. Always finish with very fine sandpaper or 000-steel wool to return the chinrest to a satin finish." See Kempter, 23.

[132] Ibid., 160.

2. "A chin rest that exhibits a downward slope from the rear of the rest will direct the chin pressure toward the neck, providing good leverage;"
3. "To avoid skin irritations created by the jawbone pressing on the ridge, the contour of the chin-rest ridge should be lower under the ear and higher on the right side, fitting the jawbone and pulling the instrument in while providing stability and a feeling of security;" and
4. "The proper height for a chin rest is one that leaves a gap of about one finger-width between the top of the rest and the jaw when the eyes are looking forward (and not looking up or down). If one must nod down in an exaggerated fashion to touch the top of the chin rest, it is too short. If the nod is too shallow, the chin rest is too high."[133]

Violinists with a less flexible left shoulder joint or narrow shoulders may want a chin rest that extends slightly over the tailpiece, whereas violinists with more flexible shoulder joints or broad shoulders may prefer a chin rest positioned to the left of the tailpiece.[134]

Shoulder rests remain one of the most debated topics in violin pedagogy. Teachers who advocate for using shoulder rests cite the secure hold it gives the violinist.[135] Others view the often-inflexible shoulder bar as a primary source of rigidity in the body. Johnson believes violinists can play with freedom and healthy movement with or without a shoulder rest as long as they have a correct anatomical understanding of the collarbone, and the shoulder support does

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[133] Lynne Denig, "How to Select the Right Chin Rest for Violin or Viola," Strings Magazine, Nov. 1, 2010, https://stringsmagazine.com/how-to-select-the-right-chin-rest-for-violin-or-viola/.

[134] Ibid.
For more information on jaw types and chin rests, see "Resources/Links," Frisch and Denig Violin and Viola Chinrest Fitting System, accessed Feb. 12, 2021, https://www.chinrests.com/resources.

[135] Horvath, 160.

not impinge the healthy movement of the shoulder. She argues that a shoulder rest that is inflexible, the wrong size, and placed incorrectly across the body results in a "mis-mapping of the collarbone as immobile and rigid."[136]

Johnson recommends using Body Mapping to "remap" your brain's neural representation of the collarbone. Gaining a more anatomically accurate understanding of the collarbone can improve shoulder and arm mobility. It can be helpful to experiment playing with small shaped sponges or without any support while remapping the collarbone. After the remapping process is successful, violinists can choose to continue playing without a shoulder rest or with small sponges or return to a shoulder rest. However, the placement and height of the rest may need to change. Johnson encourages placing the shoulder rest on the collarbone rather than the muscles surrounding it so the rest can move freely with the collarbone. Some violinists might discover that they need to use a higher chin rest or shoulder support than before.[137] When experimenting with a new shoulder rest, pad, or other supports, check the following features:

1. The violin isn't elevated too high.
2. The left arm is as low as possible.
3. The left forearm freely rotates.
4. The violin is not held too far to the left of the body.
5. Does the shoulder rest need lifts to fill the space between the body and the violin?[138]

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[136] Johnson, 157.

[137] Ibid., 157–158.
Johnson provides extensive information and instructions for remapping in *What Every Violinist Needs to Know About the Body*. For more information on Body Mapping and custom-fitting a shoulder rest, see Philip Pan, "Violin and Viola Shoulder Rests," Association for Body Mapping Educators, https://www.bodymap.org/violin-and-viola-shoulder-rests.

[138] Horvath, 160.

Kempter likens finding an appropriate setup to trying on a pair of shoes and suggests that teachers keep "sponges, scissors, pads and sandpaper readily available" to fit the instrument to the student.[139] Creating a "library" comprising many kinds of commercial chin rests and shoulder rests plus other shoulder support materials will help ensure students have a comfortable and ergonomic setup. Teachers and violinist who do not feel comfortable determining setup may prefer to consult with a professional violin fitter or certified movement coach such as an Alexander Technique or Body Mapping specialist.[140] While working with a consultant is beneficial, Paull and Harrison stress that the player must make the final decision on ergonomic modifications. They urge musicians to practice with a new setup at home before trying it out in a performance situation.[141] As students grow and require new instrument sizes, teachers should continue to reassess posture and setup. Reduce students' playing time until they are used to the new size and setup.[142]

5.4.3. Stretching

Stretching offers multiple benefits to musicians. It reduces tension and risk of injury by increasing the length of muscles and tendons and addresses muscle imbalances. By stretching opposing muscle groups, musicians gain flexibility, prevent fatigue, relieve pressure, and increase muscular efficiency. Stretching helps address tension in the shoulders, back, and

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[139] Kempter, 23.

[140] Professional services include Volute Services International, Artist in Balance, and Frisch and Denig. See Claire Stefani, "Neck Pain Violin," Volute Service International, accessed Feb. 12, 2021, https://www.voluteservice.com; "Artist in Balance," Artist in Balance, accessed Feb. 12, 2021, https://www.artistinbalance.org; and "Home," Frisch and Denig Violin and Viola Chinrest Fitting System, accessed Feb. 12, 2021, https://www.chinrests.com.

[141] Paull and Harrison, 101.

[142] Horvath, 89.

forearms from overuse, helps warm up the wrists and fingers before playing to prevent tendinitis and carpal tunnel syndrome, and reduces back and neck pain through increased flexibility.[143] Muscles lose elasticity after thirty years of age, so stretching is especially important for older players.[144]

Experts encourage warming up the body before stretching. Paull and Harrison suggest the following warmups:

1. For the whole body: briskly walk, jog, or dance to boost energy.
2. For the arms and shoulders: swing arms or do 10 self-hugs.
3. For the wrists and hands: pretend to wash hands or massage real or pretend lotion into hands.[145]

Knudson considers static stretches safest for increasing dynamic flexibility—"the increase in resistance to muscle stretch"—and static flexibility—"the passive motion limits of joints."[146] Paull and Harrison suggest holding static stretches for 30–60 seconds to lengthen the muscle and repeating them 3–4 times.[147] The following ways to safely stretch outlined by Horvath include:

1. Don't bounce the body part.
2. Don't stretch until you hurt (this causes over-stretching).
3. Use slow and gentle pressure.
4. Remember to breathe.

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[143] McAllister, *The Balanced Musician*, 255–257.

[144] Horvath, 99.

[145] Paull and Harrison, 110.

[146] Knudson, 150.

[147] Paull and Harrison, 110.

5. Let the body relax while holding the stretch.
6. Feel the stretch only in the targeted muscle.
7. Stretch regularly throughout the day.[148]

Musicians are recommended to stretch before practice to warm up the body, during practice for about five minutes to refocus, refresh, and relieve tension, and after practice for over five minutes to repair muscles and tendons and regain flexibility. Any muscle soreness and tightness may indicate a need for longer stretching sessions.[149] Cool down after playing by repeating warmups and stretches.[150] Violin teachers interested in teaching stretches to their students can consult Horvath's *Playing (Less) Hurt*, which offers multiple series of stretches for musicians to perform on stage and before, during, and after practicing, and *The Athletic Musician* by Paull and Harrison, which provides detailed instructions for stretches targeting muscles throughout the body.

5.4.4. Yoga

Many experts cite the benefits of yoga for both strengthening and stretching the body. Yoga, McAllister argues, develops a fundamental awareness of breath, body, and alignment that can help students improve listening skills and play more fluidly, efficiently, artistically, and without anxiety. Incorporating yoga into music lessons with students of all ages and abilities can also help students practice mindfully and more readily achieve peak performance.[151] Some music

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[148] Horvath, 99–100.

[149] McAllister, *The Balanced Musician*, 257.

[150] Paull and Harrison, 111.

Paull and Harrison claim cool down stretches are more effective than getting a massage.

[151] McAllister, *Yoga in the Music Studio*, xvii.

students may "equate effort with progress, and use more power than is required at their instrument. They might even practice for long hours and become numb to the effects of fatigue on the body."[152] Yoga can help students increase their sensory awareness and address correct chronic tension patterns.[153]

One resource tailored for violinists is Murray's "Using Iyengar Yoga to Enhance Violin Playing," where she outlines a yoga program offering series of Iyengar Yoga *asanas* (postures) for violinists in the practice room, ensemble rehearsal, private lesson, and performance setting.[154] McAllister also provides highly descriptive and easy-to-follow scripts and photo guides for yoga *asanas* and sequences in *Yoga in the Music Studio* to help music teachers confidently teach yoga with no any teacher training or certification. She tailors scripts, instructional themes, and pedagogical practices to different age groups and abilities, including early childhood, adolescents, advanced and professional musicians, and seniors, in order to meet the appropriate developmental and physical needs of students. McAllister recommends picking a few strategies, like beginning a music lesson with *pranayama*, to incorporate yoga into the music studio.[155] She offers the following suggestions for helping students with tension:

1. Allow students to explore how movement patterns feel in their body rather than just guide them into the correct pose.[156]

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[152] Ibid., 64.

[153] Ibid., 49–50.

[154] Hannah Murray, "Using Iyengar Yoga to Enhance Violin Playing" (DMA diss., University of Oklahoma, 2017): 102, SHAREOK.

[155] McAllister, *Yoga in the Music Studio*, xx.

[156] Ibid., 49.

2. Help students understand the difference between relaxation and tension through awareness before telling them to let go of the tension.[157]
3. Use cues for creating ease such as "release the jaw, letting the tongue hang loose and thick in the mouth," "release the shoulders," "smooth out the skin on the forehead," and "create an 'inner smile.'"[158]

While practicing yoga can be beneficial for musicians, it may not address directly inefficient or incorrect habitual movements manifesting only while practicing or performing. Working with a yoga teacher in-person, or even following along with an online class, can help provide the violinist with appropriate verbal cues to move safely, or the violinist might consider incorporating concepts learned in other somatic disciplines.

5.4.5. Working with Professionals

A final note on posture and alignment—the interventions described above can be readily administered by or prescribed by the violin teacher during the applied lesson. Musicians regularly work with somatic practitioners certified in Alexander Technique, Feldenkrais, Body Mapping, Pilates, Timani, the Franklin Method, and other methods to improve posture and alignment. Teachers may determine the best intervention for the student at hand comes from one of these methods. If so, violinists with extensive experience as students, or better yet, as qualified teachers in these methods may prefer to use them as their predominant tool for training and conditioning interventions. Otherwise, students should be referred to outside experts.

[157] Ibid., 64.

[158] Ibid., 65.

5.5. Practice Modifications

Interventions for practicing technique may be deemed necessary in QMD. These modifications to practicing need to be appropriate to the student's motor skill level and the skill being learned.[159] Broadly, violin teachers can establish practice habits, systems and processes, and mindsets—collectively referred to as **metastrategies**—and they can use specific strategies to practice technique and musicality.[160] Teachers must first determine whether the student's practice system requires refinement—a metastrategies intervention—or if a specific movement or technique needs an intervention.

5.5.1. Metastrategies Interventions

Organized practice affects the motor responses involved in movement, meaning how we practice builds the pre-existing motor patterns used while playing.[161] Twenty-first century music performance and pedagogy literature wholeheartedly endorses **deliberate practice,** an umbrella term covering motor learning and performance research exploring effective practice strategies and habits. Because students are encouraged to act as their own self-teacher while practicing, Jorgensen recommends structuring practice sessions in the three phases of self-teaching:

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[159] Knudson, 147.

[160] Harald Jorgensen, "Strategies for Individual Practice," in *Musical Excellence: Strategies and Techniques to Enhance Performance,* ed. Aaron Williamon (Oxford, Oxford University Press, 2004), 87.

[161] Helding, 112.

1. **Practice planning and preparation**. This includes organizing and selecting practice strategies, identifying specific goals and practice objectives, and determining time management strategies.[162]
2. **Practice execution**. Executive strategies are used during practice sessions to address and achieve goals and objectives.[163]
3. **Practice observation and evaluation**. Students self-evaluate by comparing their playing to aural and visual models or detecting and correcting errors. Students should make practice plans for future sessions based on their self-evaluations.[164]

Musicians at every ability level need to have a repertory of practice strategies and understand when and how to use them.[165]

A. Evaluating practice habits

To determine metacognitive understanding (knowledge of practice strategies), observe your practice behavior and analyze which strategies you use. Take inventory of:

1. Favorite practice strategies used to address technical aspects.
2. The systems and processes used to plan and execute your practice (for instance, determining repetition schemes and how and when to isolate and reintegrate sections from repertoire).
3. Time management strategies.

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[162] Jorgensen, 88–91.

[163] Ibid., 85.

[164] Ibid., 96–97.

[165] Ibid., 85.
To learn more about specific deliberate practicing strategies and systems, see Harald Jorgensen, "Strategies for Individual Practice," in *Musical Excellence: Strategies and Techniques to Enhance Performance*, ed. Aaron Williamon (Oxford, Oxford University Press, 2004).

4. The optimal state of mind for practicing.[166]

This practice inventory can easily be adapted in the lesson environment as student self-assessments or guided questions by the teacher in order to evaluate students' practice habits, routines, and systems and introduce new strategies.

B. Warm up and cool down routines

Assess the student's warmup and cool-down routines. Do they warm up off the instrument first? It helps to spend five minutes moving the body aerobically (such as by walking) before stretching the upper body muscles.[167] The pillars of a good instrumental warmup include moving gently and safely, varying technical exercises and movements, playing at moderate speeds, and maintaining neutral body positions. Paull and Harrison recommend violinists play with a wide, relaxed vibrato, work on intonation without vibrato, avoid playing in high positions (relaxed shifting exercises are safe), and to not practice double-stops, *sautille*, or long sustained bow exercises as warmups.[168] Horvath stresses that technical exercises and passagework are *not* warmups.[169] For teachers looking to integrate warmups into studio or technique classes, Thompson-Robinson offers off-instrument and violin-specific warmups designed for a group class setting.[170] Students should also plan time at the end of their practice to cool down and

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[166] Watkins and Scott, chap. 4.

[167] Horvath, 178.

[168] Paull and Harrison, 141.

[169] Horvath, 178.

[170] See Thompson-Robinow, 155–160.
While Thompson-Robinow suggests doing long-tone bow exercises as a group warmup (against the advice of Paull and Harrison and Horvath), she provides cues and other directions to help students release tension while playing the exercise.

stretch, such as self-massaging the hands, arms, and shoulders and counter-exercising the upper body muscles in the opposite directions they move while playing.[171]

C. Rest periods

How does the student incorporate rest periods into their practice? Musicians can not only set time limits for practice sessions but also include brief time-outs during playing sessions. These moments of rest can be used to take a water break, to record and play back brief excerpts for analysis, for stretches and exercises, walking across the room to adjust a metronome, breathing, score study, or mental imagery sessions.[172] Encourage students to develop awareness of mental and physical fatigue and take breaks or a day off when needed to recover. Quality sleep is essential for effective healthy practicing.[173]

D. Body awareness

How does the student develop and maintain sensory and kinesthetic awareness of their posture, alignment, and movements while practicing? A mirror and video/audio recorder (such as a smart phone or tablet) are necessary equipment for building an external awareness of posture and alignment.[174] However, musicians need to develop heightened internal and external awareness of sound and technique through mindfulness or self-monitoring.[175] Türk-Espitalier

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[171] Fischer, *The Violin Lesson*, 166–167.
For more counter-exercises, see Simon Fischer, *Practice* (London: Peters Edition Limited, 2006), 272.

[172] Paull and Harrison, 143.

[173] Watkins and Scott, chap. 4.

[174] Ibid.

[175] McAllister, *The Balanced Musician*, 318.

explains that "unsatisfactory tone quality can be a hint for musculoskeletal dysbalance."[176] To integrate kinesthetic and aural awareness into practicing, she recommends musicians play a technically simple passage or melody, identify a musical goal to improve, and choose a coordination exercise from *Musicians in Motion* that corresponds with the interrelated body region to play with the instrument.[177] This practice strategy can be scaled up to more difficult pieces as the violinist becomes comfortable. Students can also develop awareness of musical passages or techniques where they feel a lack of confidence—technical insecurities can lead to tension. To help improve confidence, pick a challenging aspect of technique, movement, or sound production and design practice strategies using aural, visual, and kinesthetic approaches and intentional external or internal awareness.[178] Teachers can also integrate concepts from Alexander Technique, Feldenkrais, and other somatic methods teaching body awareness.

5.5.2. Technique Interventions

Teachers may need to provide recommendations to help students practice specific movements and techniques. There are many different approaches and factors to consider when determining a technique intervention.

A. Open and Closed Learning Environments

Does the student need to learn or remediate a specific skill? Kinesiologists recommend creating a closed practice environment—meaning the skill is isolated from the rest of the activity to reduce stress and performance anxiety and limit distractions. For violinists, this is equivalent to taking a technical skill like playing chords out of its musical context. Once the student is

[176] Türk-Espitalier, 128.

[177] Ibid., 104–105.

[178] Watkins and Scott, chap. 4.

comfortable with the new or corrected skill, they may start transitioning into a more open environment.[179] For violinists, this means putting the skill into musical context and eventually into a performance situation. Teachers might use etudes as an intermediary step between basic exercises and repertoire to gradually build comfort in a musical context, but Jorgensen cautions that etudes and exercises must positively transfer to the targeted musical passage to be effective.[180] Finally, add competitive elements to simulate performance pressure—such as performing a section or full run-through with an elevated heartbeat, video/audio recorder, or audience.[181]

B. Practice schedule

Would the student benefit more from practicing a specific skill or movement using a blocked practice or random practice schedule? In a **blocked practice** schedule, the student has several tasks to complete and divides up their practice time evenly so that each task has its own designated block of time. In a **random practice** schedule (also known as distributed or interleaved practice), the student quickly and frequently switches between tasks so that no single task is repeated consecutively. For instance, instead of practicing skills A, B, and C each for its own 15-minute block of time, practice each skill for 3 minutes and alternate skills in a pattern like ABC, BCA, CBA.[182] Motor learning research shows that blocked practicing is helpful for

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[179] Knudson, 147.

[180] Jorgensen, 93–94.

[181] Knudson, 149.

[182] Christine Carter, "Why the Progress You Make in the Practice Room Seems to Disappear Overnight—Part 1," The Bulletproof Musician, accessed Feb. 17, 2021, https://bulletproofmusician.com/why-the-progress-in-the-practice-room-seems-to-disappear-overnight/.

beginners and when learning a new skill, whereas random practice benefits long-term learning more.[183] Teachers can consider both the student's ability level and whether the skill or movement in question is new, in remediation, or being refined when assigning practice tasks. Violinists should also consider waiting to learn new technical habits until the "off season" (such as between orchestra seasons or after significant evaluations and performances like juries, recitals, and competitions) so they have time to integrate the new motor pattern.[184]

C. Movement/Technique Phases

Can the skill be broken down easily into movement phases and other components?[185] A singular violin technique can be broken down many ways depending on the skill, including isolating the left-hand and right-hand components, practicing the coordination between the hands, or segmenting the technique by string or register/position.[186] Teachers can heighten students' awareness of the movements involved in each phase of technique. For example, figure 5 shows a passage where the violinist moves from playing first-finger F on the E string back and forth to the third-finger notes on the E, A, D, and G strings. Fischer is concerned that the violinist will play each third-finger note on the next consecutive string too low, explaining that "the feeling of the distance of the major third [between F and third-finger A on the E string] seems less than if you play third-finger D on the A string… This is because of the extra distance the

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Random practice does not have to be done at random. Instead, the brain is fooled into thinking the skills are performed randomly as long as no skill is repeated consecutively in a short period of time.

[183] Helding, 111.

[184] Watkins and Scott, chap. 4.

[185] Knudson, 148.

[186] Horvath, 181.

finger has to reach to get to the A string, or the other strings. There is more widening at the base joint, which makes it a larger distance."[187] In this instance, violin teachers might want to ensure

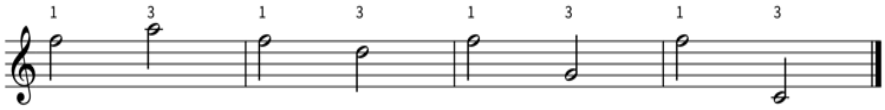

Figure 5. Fischer's Example of Movement Awareness in Technique. Adapted from Simon Fischer, *The Violin Lesson* (London: Peters Edition Limited, 2013), 78.

that the student understands the feeling of the finger reaching up and over towards the lower string in addition to widening at the base joint. This can be accomplished by drawing attention to the left arm rotating at the shoulder joint and the left hand pivoting at the base of the index finger against the side of the fingerboard.

Teachers may also consider whether the student is learning a new technique or remediating a skill. One method involves using a whole-part-whole learning process for new movements and a part-whole isolation process for remediation. When making a challenging correction or changing a movement pattern with a student during instructional time, Knudson recommends changing practice tasks and feedback frequently, beginning the QMD observation process over again.[188]

What if a teacher is struggling to help a student improve a musical passage? Fischer views violin repertoire as a rapid series of fundamental techniques—eight notes in a row might require a different technique on each note—and argues the quickest way to advance is to practice

[187] Fischer, 78.

[188] Knudson, 148–149.

and master exercises isolating one fundamental concept at a time.[189] The teacher can consider which fundamental techniques are involved in a passage and then determine which one requires intervention. Pedagogical texts like Fischer's *Basics*, Zweig's StringPedagogy.com, Rolland's *The Teaching of Action in String Playing*, Kempter's *How Muscles Learn*, and Thompson-Robinow's *The Embodied Violinist* offer many fundamental exercises that teachers can assign to help students master individual components of technique. Teachers can also create their own exercises directly from the repertoire to create meaningful connections between the repertoire and technique. Fischer's *Practice* provides 270 examples violinists can adapt to their own repertoire.

D. Student ability level

What is the student's current level of playing? And does it matter? Students of all abilities benefit from practicing like beginners. One way to look at challenging repertoire is that it combines more fundamental techniques than beginning and intermediate pieces.[190] Students can learn to consciously recognize patterns, techniques, and musical gestures in different repertoire and situations.[191] Fischer advocates continually returning to basic exercises, scales, and etudes to reestablish and build from a secure musical and technical foundation.[192] This allows violinists to approach practicing like novices and address basic technical and movement issues.[193] From a motor learning perspective, however, advanced students may require more

[189] Fischer, *The Violin Lesson*, 99–101.

[190] Fischer, *The Violin Lesson*, 101.

[191] Watkins and Scott, chap. 4.

[192] Fischer, *The Violin Lesson*, 105.

[193] Ibid., 102.

practice to make slight improvements than beginners. Teachers can consider creating a practice schedule where practice tasks are changed frequently to challenge and motivate advanced students.[194]

E. Practicing with Intent

How can teachers help their students to practice more intently? Musicians are encouraged to strive to increase accuracy and technical control while always fostering ease.[195] Watkins and Scott observe that inaccurate music practice involving many repetitions may lead to students learning to play with excessive tension and misalignments. They stress the importance of practicing slowly enough to ingrain musical success from the earliest stages of learning a skill or piece.[196] There are benefits to practicing at both slow and fast tempi. Fischer believes that violinists should practice passages at performance tempo even before they are completely at ease to get comfortable performing, as well as doing slower and more technical work.[197] Slow tempos and movements may not translate fully to performance tempo or complete automaticity. However, "slow practice" may not always be a literal interpretation, but more of a state of conscious intent.[198] In either case, teachers can carefully consider whether a student's goal is remediation, rehabilitation, or refinement when recommending a practice strategy and related tempi.

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[194] Knudson, 147.

[195] Watkins and Scott, chap. 4.

[196] Ibid.

[197] Fischer, *The Violin Lesson*, 109.

[198] Watkins and Scott, chap. 4.

5.5.3. Practicing Musically

While the suggestions listed above focus on technical work, musicality and phrasing can and should be built into this practice. Fischer argues that musical expression and the physical sensations involved in playing are inseparable. Violinists can maintain complete control of the instrument and play musically—in fact, greater confidence technically should facilitate—rather than restrict—artistic freedom. In every practice session, violinists can ask themselves if their technical choices are creating the desired sound, character, and phrasing, and if there is any kind of muscle tightness or fatigue preventing them from achieving their musical ideas.[199] To better answer these questions, teachers can prepare students with sufficient knowledge of practice methods and strategies and the observational and evaluative processes central to QMD.

6. Attentional Cueing

Attentional cueing (or **self-cueing**) refers to the "learner's ability to take themselves through a movement with specific cue words." It is an important skill to develop for refining and correcting movement when not working with a teacher, especially because students typically only receive 1–2 hours of face-to-face instructional time per week.

Some pedagogical texts refer to attentional cueing when discussing cognitive awareness, such as Watkins and Scott's use of "specific instructions" like "vibrate before the shift" to help direct the musician's focus while playing.[200] Similarly, Fischer claims that "practice is not a matter of playing things over and over again until they are 'correct', but more a question of

[199] Fischer, *The Violin Lesson*, 95.

[200] Watkins and Scott, chap. 4.

constantly experimenting with different proportions of actions or factors."[201] The primary question to ask when finding the right proportion, "how much should I adjust?," results in a directive—in other words, a self-cue.[202] (For more on proportions, see Critical Features and Intervention Rationales.) Teachers should actively take part in determining cue words for performance and practice. The teacher can provide general cue words or develop tailored cues through a collaborative process with the student. They must focus on meaningful parts or actions of the movement or technique in question.[203] The following chapter provides an extensive introduction to different cues and suggestions for implementation in the applied lesson.

Summary

During the diagnostic evaluation stage, teachers identify an issue and its likely cause and determine an appropriate method of intervention. These interventions include augmented feedback, demonstrations and other visual models, manual guidance, teaching aids, ergonomic modifications, strengthening and stretching, overhauling practice systems and prescribing specific practice strategies, and creating effective self-cues for home practice. Teachers should feel free to try a variety of intervention methods when attempting to solve a problem or correct an error, but QMD is most effective when briefly repeating the observation and diagnostic evaluation stages after each intervention to assess its efficacy.

[201] Fischer, *The Violin Lesson*, 97.

[202] Ibid., 98.

[203] Knudson, 150.

Chapter Six: Using Cueing and Imagery to Guide Movement

Cueing and imagery are essential components of both the preparation and intervention stages. QMD considers **pedagogical cues**—also known as coaching cues—to be one of the best ways to communicate and provide feedback.[1] Athletic coaches and instructors of yoga, dance, and Pilates regularly use functional movement cues, which are specific pedagogical cues that provide feedback to enable, modify, and improve movement performance.[2] Similarly, violin instructors constantly communicate information about tone, articulation, intonation, musicality, and technique, which all rely on using the body functionally. Pedagogical cues offer violinists an opportunity to address healthy playing techniques and movement efficiency while taking into account individual learning styles and necessities.

Unfortunately, many teachers in movement-based disciplines use cues they learned from their teachers and other influential pedagogues regardless of the biomechanical effectiveness of said cues, and tend to be biased towards certain kinds of cueing based on their respective modalities. For instance, dance instructors often demonstrate ideal movement through the use of visual cues while yoga teachers use verbal cues.[3] Similarly, violinists primarily teach through modeling and verbal cues.[4] Some violin teachers, however, may not discuss the physiological processes required to execute each technique or provide sufficient information to recreate the ideal sound or movement without the visual/aural model in a practice room long after the lesson concludes. "Teaching the body can be a challenge to teachers who feel that adhering to notation

[1] Ibid., 89.

[2] Eric Franklin, *The Art & Science of Cueing: Best Cueing Practices for Successfully Teaching Yoga, Pilates and Dance* (Minneapolis: OPTP, 2016), 2.

[3] Ibid., 6–7.

[4] Hiew, 12 and 103.

and/or accurate musical reproduction is the immediate goal of instruction," Kempter notes.[5] This chapter provides a theoretical introduction to cueing and imagery and offers systematic ways to create, select, and use pedagogical cues.

Part I: Introduction to Cueing

The two primary goals of motor performance are **movement effectiveness** and **movement efficiency** (also known as **muscular efficiency)**. Effective movements are more accurate, fluid, consistent, and executed at the ideal speed. Efficient movements use the least amount of energy required to complete the activity.[6] All motor learners—including musicians—desire to make their movements easy and automatic. Helding explains that music teachers use a combination of two motor learning modes to help students achieve automaticity: controlled and automatic processing. **Controlled processing** involves consciously directing behaviors—such as concise verbal directions—to communicate technical and anatomical modifications. It can be an effective learning mode for working with beginners or while changing specific aspects of technique. **Automatic processing** uses strategies like imagery, physical gestures, and appealing emotions to activate muscle memory. It can be an effective learning mode for more intermediate and advanced students who require less specific technical direction.[7] While Helding does not identify them as such, these examples of controlled and automatic processing are forms of pedagogical cues.

[5] Kempter, 10.

[6] Helding, 138.

[7] Ibid., 118–119.

A **cue** communicates information needed to enable, modify, or improve movement performance.[8] While modeling is an essential tool in music pedagogy, the instructor's demonstration skills may not always be as effective as their ability to communicate cues verbally.[9] Good cues "communicate the essence of a critical feature or technique point concisely so that the performer can remember it during practice."[10] For example, yoga teacher Adriene Mishler frequently reminds students to check their alignment for standing poses with the cue, "head over heart, heart over pelvis."[11] An easy-to-remember cue like this translates complex information about movement and alignment into simple words and phrases.[12] Franklin cautions that "you can learn the form of a movement and look like you're doing pretty well at the exercise. However, if your execution is problematic, your movement will eventually cause physical problems, such as tension, pain, or even injury."[13] Cueing can help teachers and students find the healthiest and most efficient ways to execute movements.[14]

6.1.1. Cueing in String Playing

As references to cueing in music performance and pedagogy literature deal almost exclusively with enhancing aspects of performance, violinists may be unfamiliar with

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[8] Eric Franklin, *The Art & Science of Cueing: Best Cueing Practices for Successfully Teaching Yoga, Pilates and Dance* (Minneapolis: OPTP, 2016), 2.

[9] Ibid., 8.

[10] Knudson, 89.

[11] Yoga With Adriene (Adriene Mishler), "Day 3 – Anchor | Breath – A 30 Day Yoga Journey," Jan. 4, 2021, video, https://youtu.be/hJjqx6YlcWs.

[12] Knudson, 90.

[13] Franklin, *Cueing,* 1.

[14] Ibid., 1.

movement-based cueing. Before introducing pedagogical cues for improving movement, the following section reviews popular forms of cueing used by musicians in both pedagogical and performance research.

6.1.1.1. Ensemble Cues

Musicians colloquially use the word "cueing" to refer to nonverbal cues, specifically visual and auditory cues that communicate information in ensemble playing. These **ensemble cues** include gestures, eye contact, and breathing. When musicians recognize auditory or visual cues from their collaborative partner, perception-action representations in the brain activate.[15] Embodied music cognition theories propose that the brain internally simulates (mirrors) musical gestures and facilitates the "translation of gestures into sound and the translation of sound into expressive gestures."[16] This allows the performer to recognize and respond to visual and auditory cues such as an inhale or a head nod communicating the tempo at the start of a piece.[17]

6.1.1.2. Musical Performance Cues

Performance cues assist with memory retrieval during performance. Performance cues (from now on referred to as *musical performance cues* to distinguish from *movement performance cues*) are "landmarks in the mental map of the piece that a musician monitors

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[15] Lauren Bishop and Werner Goebl, "What they listen and what they watch: Pianists' use of nonverbal audio and visual cues during duet performance," *Musicae Scientiae* 19, no. 1 (March 2015): 85, https://doi.org/10.1177%2F1029864915570355.

[16] Lauren Bishop and Werner Goebl, "Communication for coordination: gesture kinematics and conventionality affect synchronization success in piano duos," *Psychological Research* 82, no. 6 (Nov. 2018): 1179, https://link.springer.com/article/10.1007%2Fs00426-017-0893-3.

[17] Bishop and Goebl, "What they listen," 103.

during performance to ensure that critical aspects of performance go as planned."[18] They are considered one of the most effective ways for musicians to stay focused in the present moment while playing.[19] Music psychology researcher Roger Chaffin identifies four types of musical performance cues:

1. **Structural cues** outline significant moments in the formal structure, such as the end of the exposition or a change in key.
2. **Expressive cues** designate changes in musical emotion and feeling in the piece, e.g. from *dolce* to *appassionata*.
3. **Interpretative cues** highlight aspects of interpretation, like tempo changes and dynamics.
4. **Basic cues** encompass technical execution details like fingerings and bowings.[20]

Musical performance cues aid in memory retrieval during performance. Memorization is triggered by serial cueing where "auditory and sensori-motor feedback from the current passage elicits the memory of what comes next. When a performance is interrupted, however, the serial chain of cues is broken. In such cases, the musician must be able to generate his/her own cue to restart the performance."[21] Structural and expressive cues offer musical guideposts while playing, and interpretative and basic cues help recall specific musical and technical objectives. Musical performance cues can be short and memorable verbal cues that are rich in descriptive imagery and well rehearsed ahead of the performance—for example; the performer must be able

[18] Roger Chaffin et al.,"Preparing for memorized cello performance: the role of performance cues," *Psychology of Music* 38, no. 1 (Jan. 2010): 2, https://doi.org/10.1177%2F0305735608100377.

[19] McAllister, *The Balanced Musician*, 105.

[20] Chaffin et al., 2–3.

[21] Ibid., 3.

to mentally sing the cues along with the music. Teachers can encourage the use of musical performance cues by prompting students to develop their own cues using guided questioning, repeating or singing cues while the students play, and writing cues in the student's music using colored pencils.[22]

6.1.1.3. Pedagogical Cues and Imagery

Violin instructors constantly communicate information about tone, articulation, intonation, musicality, and technique using various **pedagogical cues**. For example, in violinist Zo Hurd Manfredi's study of vibrato interventions, violin teachers used positive verbal descriptions to help students reduce excessive tension in their vibrato such as "light touch," "loose," "release thumb," and "create softness in the joint." Teachers also used negative physical cues like "no clenching," and "no squeezing."[23] However, some of these cues lack anatomical specificity or do not provide clear instructions in order to achieve the desired quality of softness and relaxation. How does a student "create softness in the joint?" Manfredi also notices that the teachers primarily provided descriptive corrections for the hand, wrist, and parts of the arm, but not for addressing excessive tension in the left shoulder.[24]

Metaphor-based cues are considered to be essential teaching tools for postsecondary instruction, as music pedagogy research finds that collegiate applied music teachers use less

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[22] McAllister, *The Balanced Musician*, 105–206.

[23] Zo Hurd Manfredi, "Physical Problems in Vibrato Amongst First-Year College Violinists: A Descriptive Study" (DMA diss., University of North Texas, 2015), 42-43, ProQuest Dissertations & Theses Global.

[24] Ibid., 44.

modeling and more verbal techniques.[25]) Violinist Sarah Nematallah reviewed linguistic metaphors used by Toronto-based university and conservatory violin/viola instructors in applied lessons and finds that teachers tended to describe sound, pitch, rhythm, melodies, and phrasing as physical entities—such as a "round sound" or as personified expressions—like "the sound is agitated."[26] However, teachers rarely used metaphors to describe instrumental technique. Nematallah finds only two conventional metaphors used to describe bow strokes—"hooking" the bow and "breaking" the bow. These metaphors describe two types of bow usage—articulating multiple notes in the same direction and changing bow direction—but do not provide any information about the physical movements of the arm and hand involved in bow technique.[27] Music educator Elaine Colprit similarly finds that Suzuki violin and cello teachers provide verbal feedback and demonstrations or give instructions that target musical results such as sound and expression more often than targeting left-hand or right-hand physical gestures. Of 1,748 performance trials conducted with experienced Suzuki teachers working with beginning and advanced students, only 42% showed students successfully achieving the prescribed targets.[28] Colprit hypothesizes that students need more specific and vivid, movement-centered descriptions.[29]

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[25] Sarah Nematallah, "The Use of Metaphors in University/Conservatory Level String Teaching" (unpublished Masters research study, University of Toronto, June 10, 2012), 1, typescript.

[26] Ibid., 13–19 and 23.

[27] Ibid., 18.

[28] Elaine J. Colprit, "Observation and Analysis of Suzuki String Teaching," *Journal of Research in Music Education* 48, no. 3 (Oct. 2000): 215–216, https://doi.org/10.2307%2F3345394.

[29] Ibid., 216.

Posture and movement-based changes require active participation from students. Successful teaching, Franklin believes, requires a greater understanding of how to transfer information about movement to students, as their experiences are directly influenced by their instructor's cues.[30] Teachers can use cues to help students develop body awareness, notice positive changes in movement and alignment, and replicate more efficient movements. The following sections draw on athletic and dance pedagogy research to expand the collective understanding of pedagogical cueing in violin pedagogy.

6.1.2. Types of Cues

There are three broad categories of pedagogical cueing: prescriptive cueing, student-centered cueing, and self-cueing.

6.1.2.1. Prescriptive Cueing

Prescriptive cueing is teacher-led cueing. Instructors use these cues to provide information that can change the quality and speed of movement and improve coordination.[31] Instructors use four types of prescriptive cues:

1. **Movement performance cues**: these cues influence aspects of movement such as posture; the initiation, direction, speed, quality, and range of movement; and the effort required.[32] Examples of movement performance cues when moving to a lower string on the violin could include "gently swing your left elbow to the right," "feel the base of the left index finger pivoting on the nut," or "feel the arm and hand coming up and over the fingerboard."

[30] Franklin, *Cueing*, 7–8.

[31] Ibid., 20.

[32] Ibid., 27.

2. **Anatomical cues**: these influence muscle tone and posture.[33] An example of an anatomical cue might be "bend your knees."
3. **Motivational cues**: these cues enhance how it feels to perform the movement.[34] Franklin explains that students tend to focus on negative aspects they wish to fix, but it is important for them to learn how to describe the ideal state they want to perform in.[35] An example of a motivational cue used by Franklin before performance is "feel your breath giving you lots of energy."[36]
4. **Metaphorical cues**: The cues are metaphors influencing movement dynamics.[37] (Zweig uses analogy-based cues in similar fashion, encouraging students to "sway like a tree in the wind" to help create the feeling of shifting weight back and forth across the feet before playing.[38])

6.1.2.2. Student-Centered Cueing

Using **student-centered cues**, the instructor helps the student discover which cues and feedback are most effective for them. This process can involve using open-ended questions, asking the student to choose from several cues, comparing two different ways of moving or cueing, reversing teacher-student roles, or exaggerating errors. Student-centered cueing actively

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[33] Ibid., 21.

[34] Franklin, *Conditioning for Dance*, 26.

[35] Franklin, *Cueing*, 4–5.

[36] Ibid., 21.

[37] Ibid., 21.

[38] Mimi Zweig, "Lesson One with Sadie," Sept. 3, 2017, video, https://youtu.be/Ys0M1W31mSQ.

involves students in the learning process cognitively, physiologically, and socially, and can be a creative and fun experience.[39] However, student-centered cueing is best combined with other forms of cueing and may not be what the instructor perceives the student needs.[40]

6.1.2.3. Self-Cueing

Self-cueing (or **attentional cueing**, as discussed in Chapter Five) provides oneself information about how to move more efficiently. Unlike in prescriptive and student-centered cueing where the teacher facilitates the cueing process, the student uses self-talk and imagery to direct their own movement.[41] Self-cues can be influenced by the student's body image, their experience in a classroom setting, and their teacher's voice and body language. Franklin relates self-cues to **inherent (**or **autonomous**) **feedback**, which is sensory feedback received from the environment and your personal experience of doing the activity without the presence or influence of your instructor.[42] Violinists use self-cues frequently in the practice room and during performance.

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[39] Franklin, *Cueing*, 22–26.

[40] Ibid., 22.

[41] Ibid., 19.

[42] Ibid., 3 and 18–19.
Helding also refers to autonomous feedback as **inherent** or **intrinsic feedback**, noting that performers process information from proprioceptors—the sense receptors within the body communicating kinesthetic information to the brain—and the rest of the senses. See Helding, 120.

6.1.3. Learning Styles and Cueing

Cues can be communicated using different learning styles.[43] Franklin outlines five modes of communicating cues and offers suggestions for practicing cueing in these styles with a partner:

Visual to Kinesthetic (V-K): more commonly known as modeling, V-K cues demonstrate a movement, which the student then copies. Teachers can supplement V-K cues with verbal descriptions of the movement (also known as **cognitive cues**).

To practice: model a simple movement with a partner, who then repeats the movement with their eyes closed in order to remove visual feedback and focus on their kinesthetic sensory feedback. Graduate from simple movements to more complex movements.

Tactile to Kinesthetic (T-K): also known as **tactile cueing** or **haptic information transfer**, T-K cues uses touch to transmit information about movement—such as by lightly touching or moving the student's arm—and therefore require clear verbal consent from the student and respect on the part of the teacher. An alternative method for T-K cueing involves directing the student to touch their own body part or bone. The goal of T-K cueing is to inform the student where to engage or relax muscles or to initiate movement.

To practice: exercise one—choose an area of the partner's body to move (such as the arm) while the partner keeps their eyes closed. The partner then opens their eyes and repeats the movement. Exercise two—the partner places their hands on your body (such as the shoulder blades) while you demonstrate the movement. Then the partner repeats the movement themselves.[44]

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[43] For more on learning styles, see Chapter Three.

[44] Franklin, *Cueing*, 9–11

Kinesthetic to Visual (K-V): these cues translate the teacher's kinesthetic experience of a movement into a visual model for the student. Teachers all have had the "experience of looking at movement performed incorrectly and actually feeling uncomfortable in our own body. This is because we are to a slight degree participating in the feelings and muscle activations by watching our students move."[45] Teachers can ask themselves if the movement they observe feels the same way it does when they do the same activity.

To practice: first, move your partner's arms a few times while they close their eyes. Then show your partner the same movement and have them identify when you've moved your arms the same amount they believe they experienced with their eyes closed.

Cognitive to Kinesthetic (C-K): these cues verbally instruct the student how to move and are often combined with V-K cues.

To practice: practice cueing simple movements verbally with no demonstrations. It can be important to find your own specific ways to describe movements without relying on advanced anatomical terms as they can confuse students.[46]

Metaphor to Movement: metaphors do not require modeling or touch and therefore are highly useful for teaching children how to modify their movements.[47] Parts III and IV offer recommendations for developing and using metaphorical imagery cues.

Part II: Introduction to Imagery

Imagery is defined as the "self-generated cognitive process of creating any experience in mind with or without overt movement."[48] Instrumental musicians often use imagery concepts

[45] Ibid., 13.

[46] Ibid., 13–14.

[47] Ibid., 15.

from sports psychology research such as visualizing an ideal performance and mental rehearsal (also known as mental practice). Some violin teachers may use imagery to explain aspects of alignment and technique, like Zweig's iceberg image describing the movement of the arm while shifting and Weilerstein's energy images discussed in Chapter Two. However, violinists do not formally learn how to use imagery as a pedagogical tool. In contrast, voice and dance teachers frequently use imagery cues.

Voice teachers use imagery cues to "unlock and communicate physical sensations and to describe vocal characteristics and musical attributes that are often difficult or even impossible, to describe literally."[49] On average, voice teachers use imagery cues every 5–9 minutes during voice lessons.[50] They might use different types of imagery to solve a technical problem or identify a pedagogical theme for the lesson involving the use of an image.[51] Like musicians, dancers perform athletic but also highly artistic, specialized, and refined movements under pressure. Dance instructors regularly use imagery as a pedagogical tool in dance classes, believing that imagery is essential to skill acquisition, learning movements, and improving technique. In fact, dance imagery researchers Katherine Pavlik and Sanna Nordin-Bates suggest that dance teachers use kinesthetic imagery more extensively than athletic coaches.[52]

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[48] Franklin, *Conditioning for Dance*, 23.

[49] Chen Ti Wei, "Role and Efficacy of Verbal Imagery in the Teaching of Singing: Case Study and Computer Vocal Analysis" (PhD diss., Hong Kong Baptist University, 2006), 1, ProQuest Dissertations & Theses Global.

[50] Ibid., 150.

[51] Ibid., 153–154.

[52] Katherine Pavlik and Sanna Nordin-Bates, "Imagery in Dance: A Literary Review," *Journal of Dance Medicine & Science* 20 (2016): 52-53, http://dx.doi.org/10.12678/1089-313X.20.2.51.

6.2.1. Using Imagery to Improve Movement

Injury prevention methods like stretching may provide temporary solutions to movement-related issues but cannot always address issues with the neurological patterns directing movement.[53] Postural tendencies—such as slouching—can influence neural pathways in addition to affecting the muscles, joints, and fascia. In order to improve alignment, the brain must change on a biological level.[54] Research on **plasticity**—the brain's ability to adapt—reveals that "imagery creates biological changes in the brain that relate to the improvements of alignment and movement skills in general."[55] Franklin proposes that learning imagery corresponding with the body's anatomical functions—also known as **embodied anatomy**—can help improve alignment and movement efficiency and address movement-based technique problems.[56] This process is not a quick and easy fix—inefficient or unhealthy movement patterns may take months to remap because the neurons must learn to represent new functions, and weak and dormant neurological connections must be reawakened or strengthened.[57] However, learning correct anatomical information through the use of demonstrations, imagery, and other cues can help retrain motor control and improve motor function.[58] The ability to compare what you kinesthetically feel and

[53] Franklin, *Cueing*, 62.

[54] Franklin, *Dynamic Alignment*, 38.

[55] Ibid., xiii and 37.

[56] Ibid., x.

[57] Ibid., 37.

[58] Franklin, *Cueing*, 62.

observe with an accurate understanding of how the body functions anatomically is essential to improving movement.[59]

Teachers can affect student success through the strength of their imagery.[60] By adopting principles and systematic models of imagery from athletics, dance, and vocal pedagogy, violinists can use imagery cues to help teach technique and improve movement quality in the violin lesson and equip students with specific and personalized imagery to rehearse on their own. Many suggestions in this chapter are drawn from the Franklin Method—also known as Dynamic Neurocognitive Imagery (DNI™)—a somatic method developed originally for dancers by Eric Franklin that uses "progressive movement exercises combined with various methods of imagery to draw participants' attention to anatomical structures and locations, body biomechanics, as well as spatial and functional relationships between body segments during movement" in order to affect positive changes in posture and movement.[61]

6.2.2. Imagery Functions

Imagery can have two primary functions: motivating the performer and improving movement. **Motivational imagery** influences emotions and moods, goal achievement, confidence, and arousal.[62] It is sometimes divided into two sub-groups: **mastery imagery** for performance preparation and anxiety, planning, focus, and motivation; and **goal imagery**

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[59] Franklin, *Dynamic Alignment*, x.

[60] Ibid., 35.

[61] "Dynamic Neurocognitive Imagery," The Franklin Method, Institut für Franklin-Methode, accessed Dec. 3, 2020, https://franklinmethod.com/dni/.

[62] Franklin, *Dynamic Alignment*, 59.

visualizing the process of achieving goals.[63] Imagery that improves movement is known as **motor imagery** (or **cognitive-specific imagery**), and improves task-dependent movement through the use of **mental simulation of movement** (MSM)—or as it is more commonly known, **mental rehearsal**.[64]

Motor imagery can improve musical and artistic performance by increasing body awareness, focus, and coordination. However, body misalignments and faulty movement patterns can limit the effects of mental rehearsal. Franklin also observes that the benefits of mental rehearsal are limited to the specific movement being imaged—for example, mentally rehearsing a specific shift in a violin concerto does not automatically improve overall shifting technique. Therefore, Franklin proposes differentiating between motor imagery that focuses on improving a movement associated with a specific activity or performance—**motor-specific imagery**—and motor imagery that improves general biomechanical efficiency—**motor-general imagery**.[65] A motor-specific image may be suitable for students struggling with a specific shift in a passage of a violin concerto, whereas a motor-general image may be better suited to addressing lingering issues with the overall left-arm mechanics involved in shifting.

6.2.3. Imagery Types

Franklin outlines four types of imagery used to cue movement: biological imagery, metaphorical imagery, morphing imagery, and sensory imagery.

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[63] Pavlik and Nordin-Bates, 56.

[64] Franklin, *Dynamic Alignment*, 57.

[65] Ibid., 57.

6.2.3.1. Biological imagery

Biological imagery comprises anatomical cues and biomechanical cues. **Anatomical cues** are realistic anatomical representations of body parts.[66] The concept of **embodied anatomy** is based on the principle that anatomical knowledge can be "imagined as a function in your own body."[67] Anatomical cues can be provided during movement to improve function, facilitate good form, or improve existing cues through the addition of specific anatomical information.[68] For instance, Jennifer Johnson revises the familiar cue to nod the head onto the violin's chin rest by suggesting violinists placing their index fingers in their ears, imagining the fingers continuing through the head to meet at the base of the skull on top of the cervical spine (the atlanto-occipital, or A.O., joint), and nodding where the imagined fingertips meet.[69] Anatomical cues can also be exaggerated images, such as Franklin's cue to imagine your shoulder blades melting down your back to promote relaxation. However, anatomically incorrect cues can lead to muscular tension and dysfunction. Franklin believes that many movement modalities use incorrect anatomical cues. Learning and teaching proper anatomical cues requires time and thorough explanations using illustrations, photos, and models.[70]

Biomechanical cues describe movement and the forces involved in moving usually through the combined use of visualizations and proprioceptive information. **Kinematic imagery** focuses on actual movement such as the rotation of the forearm bones, the radius flipping over

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[66] Ibid., 64.

[67] Ibid., 45.

[68] Franklin, *Cueing*, 29–34.

[69] Johnson, 46–47.

[70] Franklin, *Cueing*, 34–35.

the ulna, as the hand moves from a palm-up to a palm-down position. **Kinetic imagery** focuses on the forces involved in movement. For example, Franklin's cue to "feel your arms float up; feel weight in your shoulders" helps enhance the quality of movement while raising your arms.[71] Vocalists often use anatomical and biomechanical images in combination with the kinesthetic feelings of singing.[72] For example, images of the back, ribs, and diaphragm aid in breath control and support.[73] When teaching with biological imagery cues, teachers should use precise images because the learning curve for biological imagery is much steeper.[74] Keep anatomical cues as simple as possible. When using biomechanical cues, instructors can switch between kinematic and kinetic imagery to evaluate which cues the student responds to more easily.[75]

6.2.3.2. Metaphorical imagery

Vocal pedagogy, dance, and athletic research recommend tailoring imagery to the individual.[76] **Metaphorical imagery** allows the instructor to create personalized and individualized imagery cues.[77] In fact, dancers most often use metaphorical imagery to help

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[71] Ibid., 36–38.

[72] Patricia Louise Bowes, "An Exploratory Study of the Use of Imagery by Vocal Professionals: Applications of a Sport Psychology Framework" (PhD diss., University of South Florida, 2009), 294, https://scholarcommons.usf.edu/etd/1867/.

[73] Ibid., 251.

[74] Franklin, *Dynamic Alignment*, 64.

[75] Franklin, *Cueing*, 38–39.

[76] Pavlik and Nordin-Bates, 60.

[77] Franklin, *Dynamic Alignment*, 64.

create and refine movement.[78] Singers also use metaphors to learn and reinforce vocal technique.[79] Franklin claims that metaphorical imagery is easier to learn quickly than biological imagery. Metaphors can communicate highly accurate anatomical information in a more easily accessible format that connects images to sense memories.[80]

Instructors can string together a series of metaphorical cues and other images to help students better remember movement sequences. These **imagery strings** supplement V-K information transfers by assigning each movement a specific metaphor.[81] For example, when teaching young students how to bow, the instructor might tell the student to make a triangle with the bow, violin, and shoulder, extend their arm into a square, and finally push their arm through the middle like a trombone slide.

Both biological and metaphorical imagery cues can help boost motor skills and performance, increase body awareness, and facilitate dynamic alignment. Vocalist Patricia Bowes observes that singers tend to use metaphorical or anatomical images depending on their personal preference and knowledge of voice mechanics.[82] However, as singers come to understand more of the mechanics of vocal production, they are more likely to incorporate biological imagery.[83]

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[78] Pavlik and Nordin-Bates, 52 and 56.

[79] Bowes, 253.

[80] Franklin, *Dynamic Alignment*, 64 and 73.

[81] Ibid., 67.

[82] Bowes, 293.

[83] Ibid., 254.

6.2.3.3. Morphing imagery

Violinists can use **morphing imagery** to alternate between anatomical and metaphorical images before, during, or after a movement. The benefits of combining anatomical and metaphorical cues include helping to keep the image vivid and anatomically accurate and achieving a specific quality of movement.[84] Franklin recommends teachers choose metaphors based on biological function but warns to "never assume that anatomical imagery is clear to your students."[85] Incorrect anatomical knowledge can affect motor control. Some common metaphorical cues used in movement disciplines actually can go against anatomical function. For example, a frequent Pilates and Yoga cue used to help prevent slouching while rotating the torso is, "imagine lengthening the spine," but Franklin explains that the spine actually becomes shorter in rotation. He encourages teachers to clarify that the intent of the metaphorical cue—such as to prevent slouching—is different than what is actually happening biomechanically. He additionally recommends providing thorough introductions to anatomy as needed to enhance biological and morphing imagery and correct any student misconceptions.[86]

6.2.3.4. Sensory imagery

Successful imagery should incorporate as much sensory detail as possible because research shows that motor imagery and actual movement use similar parts of the brain.[87] **Sensory imagery** may take the form of visual, auditory and rhythmic, tactile, gustatory, olfactory, and proprioceptive imagery. (Proprioceptive senses include kinesthetic sense, sense of

[84] Franklin, *Dynamic Alignment*, 64.

[85] Ibid., 78.

[86] Ibid., 73.

[87] Ibid., 75.

position, balance, muscle tension, gravity, and effort.)[88] In a study examining the effects of imagery on ballet dancers' *plié arabesques*, Heiland et al. found that visual, tactile, and auditory sensory imagery helped improved the dance technique.[89] Sensory imagery is also essential for child development. Children, Franklin explains, "cannot use imagery or conceive of a new object until they have sensed and therefore experienced its various components. The accumulation of sensory perceptions of an object leads to the ability to imagine it."[90] However, over-saturation of visual media in the form of television, computers, tablets, and phones has caused a trend where children cannot create as many internal sensory images and rely on images provided by an external source.[91] Educational psychologists believe that children must develop internal imagery skills by the age of six. If children miss this window for development, they may need help building their sensory imagery skills in applied music lessons.[92]

Part III: Incorporating Cueing and Imagery in the Violin Studio

The following sections offer suggestions for creating, selecting, and using pedagogical cues and imagery in the violin studio.

6.3.1. Creating Cues

Teachers can make their cues as vivid as possible by including sensory characteristics and explaining how to initiate the movement, which direction to move, how much force is

[88] Ibid., 67–69.

[89] Pavlik and Nordin-Bates, 59.

[90] Franklin, *Dynamic Alignment*, 34.

[91] Bruckner, 76–77.

[92] Ibid., 14.

required, and the range of action.[93] Kinesiologists offer four guidelines for creating prescriptive cues:

1. **Keep cues short: six words or less**. The brain's short-term memory limit is six words. Once the initial cue is learned, the instructor can modify or extend the cue as needed.
2. **Use action verbs**.
3. **Cues must be relevant to the performer and their ability level**.
4. **Use figurative or descriptive language instead of anatomical or literal descriptions**.[94]

Like Franklin, Knudson emphasizes the power of metaphors and other descriptive language to translate complex anatomical functions into easily understood concepts. Prescriptive cues can be made up of four components:

1. **Action**: a verb describing the motion.
2. **Content**: who or what is performing the movement.
3. **Qualifications**: how the cue will be successful.
4. **Special Conditions**: what extra conditions are necessary for evaluation.[95]

A prescriptive cue containing all four components might be: "keep your right wrist neutral as the bow travels to the frog." A six-word version of this cue satisfying Knudson's guidelines could be "keep wrist neutral traveling to frog."

Create cues that are specific, objective, and positive to evoke the desired feeling and movement. Negative cues like "don't shift quickly" focus on what shouldn't happen and can lead

[93] Franklin, *Cueing*, 58.

[94] Knudson, 89–90.

[95] Ibid., 90.

to tension, anxiety, and other negative feelings. However, Franklin notes that small amounts of negative cues can help remind the student if repeated positive cues fail to lead to improvement.[96]

6.3.1.1. Assembling a Repertoire of Cues

It is helpful to prepare multiple cues for the same technique in order to meet different students' learning and perceptual styles, needs, and experiences. Knudson suggests consulting available taxonomies for accepted cues in the field.[97] Although studies like Jon Clement's "The Use of Imagery in Teaching Voice" include comprehensive lists of verbal and metaphorical imagery cues for singing, no such taxonomies exist for violinists. However, violin treatises and other pedagogical materials offer possible cues for use in the violin studio. Kempter's *How Muscles Learn: Teaching the Violin with the Body in Mind* offers some of the clearest examples of how to communicate healthy movement techniques to beginning and intermediate violin students using cognitive, visual, auditory, and kinesthetic cues. Examples of these cues include:

1. Draw a line at the base of the pinky where it meets the palm and have students make sure the line is level with the fingerboard while playing to ensure the pinky is curved naturally and moving from the base knuckle joint.[98]
2. Look for wrinkles on the outside of the right wrist to check if it has bent to the right instead of remaining neutral. [99]

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[96] Franklin, *Cueing*, 57.

[97] Knudson, 89.

[98] Kempter, 42–44.

[99] Ibid., 62–64.

3. To help cue vibrato and shifts, remind students what tension-free movement in the left arm feels like when practicing preparatory shifting exercises using harmonics. Have students hear the pitch sliding upward without adding tension by pressing the strings. [100]

Kempter provides many cues for establishing basic posture, form, and left and right hand motion. She also addresses cues commonly used by violin teachers that she finds inefficient or prone to causing tension—such as telling students to play on the corners of the left fingers—and offers alternative cues—such as drawing a dot on the center of the fingertip connected to a line on the outside edge of the finger and telling students to aim for the line instead of playing on the corners.[101] While Kempter includes many examples of cueing for beginning and early intermediate level techniques, she does not provide cues for most bow strokes or for more advanced techniques like double-stops and chords.

Many violin treatises provide lengthy descriptions of ideal technique without explicit pedagogical cues to use in the violin lesson. Fortunately, implicit cues can be identified in these descriptions by looking for critical features and turning them into cues. For instance, table 7 shows how multiple types of cues can be extracted from Fischer's explanation of the concept of "Slow Arrival Speed" in shifting. This is just one example of how the complex, often dense paragraphs of information in violin treatises can be transformed for new teachers and pedagogy students into a meaningful, personalized arsenal of cues ready for use in the violin lesson.

Because experts may disagree on what critical features are involved in a movement or technique, it is helpful to learn cues from outside your area of expertise and current knowledge

[100] Ibid., 88–93.

[101] Ibid., 60.

base to expand cueing options.[102] Violinists can incorporate cues from Body Mapping such as

Table 7. Translating Cues from Violin Treatises

Elements of Fischer's Explanation of "Slow Arrival Speed"	Possible Prescriptive and Imagery Cues
Declares that shifting speed is not constant and that the hand slows down as it approaches its destination.	Model Slow Arrival Speed in a shift while having the student observe your left arm/hand and then have the student try it themselves while watching their own hand or arm. Observations can be enhanced by using a mirror or video playback.
Warns never to shift above the arrival-note. Always aim below the arrival-note and slowly adjust into the note.	Use C-K cues such as "Slow Arrival Speed," "slow down approaching the note," or "aim below the note," which also involves establishing a visual understanding of where the arrival-note is.
Includes a musical excerpt diagraming the pitch range where the hand moves quickly and where it should start moving more slowly.	Show the student a diagram of the shift in question on a musical staff so they can translate the visual information from the staff first onto the fingerboard visually and then into their kinesthetic memory.
Recounts a favorite story that the late Juilliard teacher, Dorothy DeLay, liked to tell students to illustrate the concept of Slow Arrival Speed: DeLay watching a parking attendant drive her brand new car quickly around the lot before slowing down into the parking space.	Tell DeLay's story of parking the car and then guide the student in creating an image of their hand moving like a car into a parking space. Use metaphorical cues like "park the car" or "press on the brakes" to help remind the student of the image.
Identifies acceptable sounds heard during Slow Arrival Shifts: no sound, a faint shifting sound only the violinist will hear, or an audible glissando.	Model the sound of slowing down the shift while the student listens and then imitates to help the student pick up on similar auditory cues while practicing their shifts.
Explains you can abandon the concept of "fast-slow" shifts entirely during long shifts and think instead about replacing the hand farther up the fingerboard so that the shift is much shorter	Model replacing the hand further up the fingerboard and direct the student to imitate you. Include diagrams on the score, if helpful. Use auditory cues to establish the replacement position and the Slow Arrival Speed into the arrival-note.

Source: adapted from Simon Fischer, *The Violin Lesson* (London: Peters Edition Ltd., 2013), 245–246.

those found in Johnson's *What Every Violinist Needs to Know About the Body* and other cues learned in somatic methods like Feldenkrais, Alexander Technique, Yoga, and Pilates. Franklin's *Dynamic Alignment through Imagery* and *Relax Your Neck Liberate Your Shoulders* also contain a variety of imagery and embodied anatomy cues that can be useful for violinists.

[102] Franklin, *Cueing*, 7.

Vocal educator Jon Clements encourages teachers to establish a vocabulary of imagery cues for individual students based on their life experiences, hobbies, and interests. He suggests using the following questions to help get to know the student's interests and imagery experience:

1. **"What sports or physical activities do you like?"** This helps the teacher know what kind of movement or kinesthetic images the student is familiar with.
2. **"To what music do you like to listen?"** This helps the teacher know what auditory models the student is familiar with.
3. **"Have you ever traveled anywhere away from home?"** This helps students imagine different cultures, locations, and people associated with the music they play or sing.
4. **"Do you play any other musical instruments or sing?"** This helps students connect kinesthetic, aural, and visual concepts to their prior experience.
5. **"What words or images come to mind for this music or sound?"** Clements encourages teachers to assess the student's imagery skills and current imagery vocabulary.[103]

By reading books, watching television and film, listening to different types of music, and staying current on cultural trends, teachers can offer students a wide variety of personalized images.[104]

6.3.2. Selecting Cues

When selecting cues, instructors can consider the student's age, experience, interest level, and background.[105] Cater cues to the student's interest and learning style, but also supplement

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[103] Jon F. Clements, "The Use of Imagery in Teaching Voice to the Twenty-First Century Student" (DMA diss., Florida State University, 2008), 13-16, ProQuest Dissertations & Theses Global.

[104] Ibid, 33.

instruction with a wide variety of styles and images.[106] Metaphorical cues may be better for adults than children, Knudson notes, and tactile and visual cues may be better for children than verbal cues.[107] When considering the student's skill level, use concepts and language that are age-appropriate, related to the modality—for example, concepts that address other instrument families like keyboards and winds may not work with string instruments—and that have already been properly introduced. This is especially important when using cues dealing with anatomical function.[108] Franklin recommends selecting cues that meet the "**Necessary-Useful-Fun (NUF) Principle**." Focusing on how the movement feels, identify the most important cue necessary to improve function, determine useful supporting cues, and add cues that make the movement fun.[109] Three fundamental questions for the teacher to consider:

1. What is the student's current skill level?
2. What are your goals for student performing this repertoire or technique?
3. What cues would be most appropriate to achieve the desired goal?[110]

Teachers should consider when a cue is an exercise opinion versus a functional biomechanical cue.[111] Cues must "enable the discovery of the movement pattern that is the most healthy and functional, rather than forcing a student into the proper form of the exercise. There

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[105] Knudson, 89.

[106] Franklin, *Cueing*, 58.

[107] Knudson, 90.

[108] Franklin, *Cueing*, 7.

[109] Ibid., 3.

[110] Ibid., 17.

[111] Ibid., 58.

always needs to be a good balance between form and function."[112] Three questions to consider when choosing a cue:

1. "Does the cue support healthy anatomical function?"
2. "Does the cue reflect the goal of the exercise?"
3. "Does the cue respect the skill level of the student?"[113]

6.3.3. Using Cues

Vocal teachers often use a three-step process for using imagery and other cues in voice lessons—identify a technical or musical problem, give instructions or provide an imagery cue, and correct technical and interpretive elements.[114] Franklin and Knudson expand on this process with recommendations for working with different types of cues.

Prescriptive cues and imagery can be provided before, during, or after the movement.[115] Kinesiologists suggest making task sheets outlining specific cues or sequences of cues that correspond with these three phases of movement and can be easily referenced during instruction.[116] In contrast, Franklin encourages instructors to be less structured and to vary their use of cueing and imagery.[117] One way to be more varied is to switch between anatomical and metaphorical cues using morphing imagery. For beginners, it helps to provide the cue before the movement. Offering some feedback during and after the movement can be helpful only as long

[112] Ibid., 1–2.

[113] Ibid., 17.

[114] Chen, 153.

[115] Franklin, *Cueing*, 61.

[116] Knudson, 90–91.

[117] Franklin, *Dynamic Alignment*, 61.

as the student doesn't become overwhelmed and lose focus. Teachers can "layer" cues by providing several cues simultaneously, but Franklin warns not to provide over three cues at one time and to limit oneself to one cue for beginners.[118] It can be helpful to prescribe short cueing and imagery homework and mindfulness exercises to help students review and reinforce cues after the lesson has ended.[119]

Student-centered cueing can be facilitated using open-ended questions and through the use of situational tools as shown in figure 6. While it is important to get student feedback from a cue, dance research reveals that performers do not always know if their imagery cue is effective. In Heiland et al.'s study of ballet dancers using imagery to improve their *plié arabesques*, Heiland and associates found that 100 percent of the dancers who did not improve thought they had, while 60 percent of the dancers who did improve thought they had not. It is important to get outside feedback from the instructor or other observers in order to accurately assess improvement in performance.[120]

6.3.4. Cueing Effectiveness

Voice teachers modify imagery cues by varying their word choice and descriptions if students do not show improvement.[121] Cues are susceptible to interpretation, Franklin explains, and the student's perception of a cue influences the quality of their movement. Teachers can assess the effectiveness of a cue by observing how the student responds to the cue. Does the

[118] Franklin, *Cueing*, 5.

[119] Ibid., 63.

[120] Pavlik and Nordin-Bates, 56.

[121] Chen, 151.

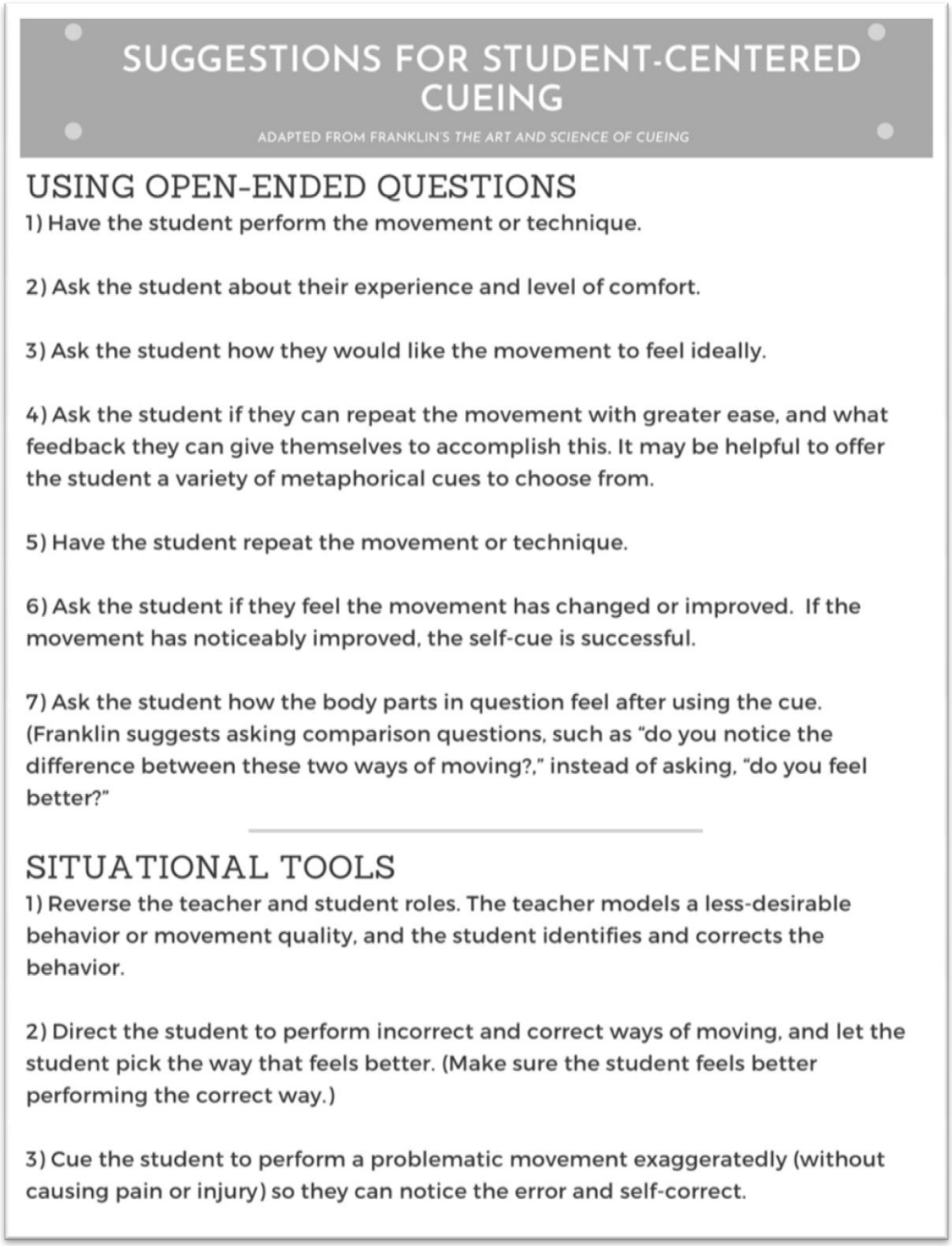

Figure 6. Suggestions for Student-Centered Cueing. Adapted from Eric Franklin, *The Art & Science of Cueing: Best Cueing Practices for Successfully Teaching Yoga, Pilates and Dance* (Minneapolis: OPTP, 2016), 4, and 22–26.

student perform the movement in an anatomically correct way? Asking the students questions about the movement helps determine how well the student understands or interprets the cue and informs the teacher whether they require more anatomically specific information.[122] **Miscues**—incorrect or misinterpreted cues—can still produce improvements in movement, but Knudson acknowledges that more research is needed to determine "how age, skill level, and aspects of cues interact to foster communication of movement information and aid learning of motor skills."[123]

If a cue is not working, physical limitations like fascia restrictions and muscle tightness may be a factor. Exercise, stretching, and massage can help free up the body. The instructor may also need to simplify the movement to a more appropriate skill level.[124] However, if the student's movement doesn't improve, the teacher should discard the cue to prevent reinforcing bad habits and try a different cue.[125]

Part IV: Teaching and Learning Imagery

Dance imagery researchers recommend setting aside instructional time for teaching imagery and reinforcing its importance in enhancing movement and performance. Many dance classes are 1–1.5 hours long—similar to applied violin lessons—which often cause instructors to limit the duration of imagery training to five minutes or less. Most violin teachers likely spend even less time. However, research studies find that athletes who spend more time using imagery

[122] Franklin, *Cueing*, 16.

[123] Knudson, 90.

[124] Franklin, *Cueing*, 60.

[125] Ibid., 16.

have more positive outcomes in performance, so violin teachers should consider the benefits of teaching students how to use imagery.[126]

The process of learning imagery follows the **three associative stages of motor learning**. In the **cognitive stage**, the teacher guides the student in understanding the sensory details of the image, anatomical context, and the desired result using diagrams, pictures, and tactile cues. In the **processing** (**or associative**) **stage**, the student begins to internalize the image with support of the teacher, experiments with the image to make it more personalized, and starts to see positive results. In the **application stage**, the image is now fully integrated and automatic, and the student consistently achieves the desired result. The student only uses the image when needed.[127]

6.4.1. Delivery Styles

Imagery can be delivered in three styles: guided imagery, programmed imagery, and intuitive imagery. **Guided imagery** is narrated imagery used to promote healing and relaxation. Popular forms of guided imagery included body scans for increasing body awareness or releasing muscular tension.[128] These are often available as audio recordings or scripts read by the teacher. McAllister's *Yoga for Musicians* and *The Balanced Musician* include several guided imagery scripts for relaxation.

Programmed imagery (also known as **prescriptive** or **deliberate imagery**) is delivered by a teacher in an instructional setting.[129] Recent findings in dance imagery research recommend

[126] Pavlik and Nordin-Bates, 58.

[127] Franklin, *Dynamic Alignment*, 84–85.

[128] Ibid., 66.

[129] Franklin, *Dynamic Alignment*, 71.

that teachers plan their images in advanced and teach imagery in a systematic method.[130] Three models discussed later, the Revised Applied Model of Deliberate Imagery Use, the PETTLEP checklist for motor imagery, and the APAC model for self-cueing and imagery, offer instructors structure and guidance for creating and using imagery with students.

Intuitive imagery (also known as **spontaneous** or **receptive imagery**) is spontaneously created. The ability to create intuitive images comes from practicing programmed imagery regularly. The types of images spontaneously created usually correspond to the types of programmed imagery used most frequently.[131] Although Franklin considers intuitive imagery to be primarily a tool for self-cueing, he acknowledges that many instructors regularly use spontaneous programmed images. In fact, Pavlik and Nordin-Bates find that dance teachers prefer using spontaneous imagery in the classroom.[132] Similarly, Chen confirms that while some voice teachers use a "pre-planned and systematic teaching strategy/repertoire for using verbal imagery," others believe spontaneous imagery works best in the voice lesson because the images are tailored to individual students' needs, abilities, and personalities.[133] However, spontaneous imagery can appear to the outside observer as unstructured and unplanned instruction in the classroom. Pavlik and Nordin-Bates hypothesize that this causes dance students primarily learn imagery techniques by observing their teachers using imagery themselves rather than through systematic process. To counter this, teachers can use the Revised Applied Model of Deliberate

[130] Pavlik and Nordin-Bates, 58.

[131] Franklin, *Dynamic Alignment*, 71.

[132] Pavlik and Nordin-Bates, 59.

[133] Chen, 152–153.

Imagery Use and the PETTLEP checklist to create more vivid, personalized, and research-driven imagery.[134]

6.4.2. The Revised Applied Model of Deliberate Imagery Use

The original applied model of deliberate imagery use**,** created by Martin, Moritz, and Hall in 1999, proposes that "individuals should use the optimal type/function of imagery for achieving their desired outcomes" and that imagery ability influences how effective their imagery will be. Sports researchers Jennifer Cumming and Sarah Williams propose a revised model based on recent findings in imagery research to help design effective imagery interventions.[135] The **Revised Applied Model of Deliberate Imagery Use** describes eight essential components of programmed imagery: who, what, where, when, why, how, meaning, imagery ability, and the desired outcome.[136]

6.4.2.1. When and Where

Imagery function—why someone is imaging—is situational, so Cumming and Williams encourage teachers to consider both where and when imagery takes place to maximize its potential. Imagery used during practice helps reinforce skills and technical improvements, while imagery used before competing helps prepare the violinist mentally.[137] Franklin similarly categorizes imagery function by time of day. Besides using imagery to improve movement and performance during practice, use motivational imagery to set goals in the morning and

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[134] Pavlik and Nordin-Bates, 59–60.

[135] Jennifer Cumming and Sarah E. Williams, "Introducing the revised applied model of deliberate imagery use for sport, dance, exercise, and rehabilitation," *Movement and Sports Sciences,* no. 82 (2013): 70-71, https://doi.org/10.1051/sm/2013098.

[136] Ibid., 72.

[137] Ibid., 72.

energetically prepare for the day, mentally review the day and plan for future improvements during the evening, and mentally rehearse goals and use guided imagery to relax before sleep.[138] It helps to practice imagery (especially motor-general imagery) during daily activities like chores, standing, and walking to reinforce new movement patterns and images.[139]

6.4.2.2. Who

The performer's gender, skill level, age, experience, and personality may contribute to their use of imagery and its effectiveness. Research shows that more advanced athletes and dancers use imagery more frequently than less skilled levels. Dancers with more knowledge and expertise using imagery also tend to use imagery more effectively. Personality traits like anxiety, confidence, perfectionism, and motivation may affect imagery as well.[140] Franklin also highlights the role of body image in imagery. Defining body image as the "fundamental feedback, the sum of the conscious and unconscious subjective opinions and ideas you have about your body," he argues that developing a detailed awareness of your body image and being able to describe it using specific, detailed language is essential for improving assessments. It is important to notice any differences between your perception of your body image and what you actually look like. Violinists can use videotape to observe actual posture and alignment and make weekly drawings from the front (anterior) and side (lateral) view to observe changes in your body image.

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[138] Franklin, *Dynamic Alignment*, 78–79.

[139] Ibid., xiv.

[140] Cumming and Williams, 72–73.
Gender differences depend on the activity in question. Cumming finds that "female exercisers more frequently report images of their appearance and healthy whereas males report more images of exercise technique."

Additionally, enhancing your awareness of proprioceptive sensory information—especially your sense of your body's surface, shape, volume, weight, and tension—helps improve body image.[141]

6.4.2.3. Why

Imagery function—why you use imagery—determines the outcome of imagery through the **imagery content** created (what is being imaged). Knowing the intended goal of imagery is essential to choosing appropriate imagery. In Chen's study of voice teachers' use of imagery, teachers used the same kinds of imagery with different students and different images for the same problem.[142] Similarly, dancers use the same imagery content in different situations and for different reasons.[143] For instance, mentally rehearsing the successful execution of a technical passage early in the learning process helps solidify muscle memory and learn finger patterns, whereas the same image might be used before performance to reduce performance anxiety.
It is important to consider both the individual student and situation when determining what kind of imagery content is most appropriate.[144]

4.2.4. Meaning

Imagery is "more effective when it is personalized and meaningful."[145] Imagery is highly individualized because no two people will relate to or respond to the same image identically.[146] Clements looks to the student's personality to determine the appropriate imagery for the situation

[141] Franklin, *Dynamic Alignment*, 46–48.

[142] Chen, 150–151.

[143] Cumming and Williams, 73.

[144] Franklin, *Dynamic Alignment*, 53.

[145] Cumming and Williams, 74.

[146] Franklin, *Dynamic Alignment*, 71.

at hand.[147] Likewise, Cumming and Williams recommend taking into consideration any personal meaning the student might attach to an image.[148] This helps students be more motivated in their imagery. Greater motivation allows a total focus on imagery practice, which improves movement quality and reduces chances of injury.[149]

6.4.2.5. What

Before choosing an imagery method, it helps to articulate why imagery is needed and which images work best for the student in question. Different kinds of imagery can be combined effectively for a variety of functions.[150] Such combinations include motor-general and motor-specific images, alternating between biological and metaphorical imagery (morphing imagery), and different sensory images.[151] Teachers can get feedback from the student to discover which language and mental imagery they respond to best.[152]

6.4.2.6. How (Imagery Characteristics)

Besides choosing what to image, teachers and students must establish how they will experience the imagery. These **imagery characteristics** include sensory modalities, visual perspective, viewing angle, speed, duration, and frequency.[153] Franklin believes that the strongest and most effective imagery combines different sensory modalities that work best individually for

[147] Clements, 34.

[148] Cumming and Williams, 73.

[149] Franklin, *Dynamic Alignment*, 53.

[150] Cumming and Williams, 74.

[151] Franklin, *Dynamic Alignment*, 57.

[152] Ibid., 47.

[153] Cumming and Williams, 74–75.

the student. He recommends using them simultaneously or one after another in quick succession.[154] Imagery can be cued internally and externally (see Perspective) or through the use of a live or videotaped model.[155] It helps to watch inspiring performances and try to recreate the kinesthetic experience you noticed while observing the model.[156] Finally, create a plan or structure for imagery practice, including the number of imagery sessions or repetitions leading up to the performance or goal, the length of each session, and the specific imagery content in each session.[157]

6.4.2.7. Imagery Ability

Imagery ability influences imagery effectiveness. Imagery ability is an "individual's capacity to form vivid, controllable images and retain them for sufficient time to effect the desired imagery rehearsal."[158] Research shows that people with better imagery ability benefit more from imagery, but imagery ability can also be improved through imagery practice.[159] Beginners can practice simple imagery and focus exercises unrelated to their discipline for 1–15 minutes in order to develop heightened body awareness and mindfulness. Franklin describes multiple imagery exercises for beginners in *Dynamic Alignment Through Movement*.[160] To build

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[154] Franklin, *Dynamic Alignment*, 67.

[155] Cumming and Williams, 75.

[156] Franklin, *Dynamic Alignment*, 79.

[157] Cumming and Williams, 75.

[158] Ibid., 75.

[159] Ibid., 75.

[160] Franklin, *Dynamic Alignment*, 76 and 80–85.

sensory imagery skills, violinists can determine which sensory modalities they are least comfortable with and slowly incorporate them into their imagery practice to strengthen them.[161]

Imagery ability includes three essential factors: controllability, vividness, and focus and distraction control. **Controllability** is the ability to guide imagery by generating, maintaining, and transforming images. It facilitates movement, motivation, and goal setting. If the teacher or student is not satisfied with an image, try a variety of different images to see which image best achieves the desired goal for movement.[162] Amending the imagery cue to have a motivation in addition to a kinesthetic outcome, such as "imagine your left arm is a swing so your fingers can easily reach the G string," can help students having trouble experiencing a resulting response in the body.[163] **Vividness** refers to the strength and clarity of the image. A sufficiently vivid image uses, at minimum, two sensory modalities and is "spatially and dynamically clear and crisp."[164] Franklin offers several suggestions for making images more vivid:

1. Commit to the image with enthusiasm and excitement.
2. Experiment with different sensory modalities.
3. Switch perspectives and spatial location.
4. Add environmental sensory details especially for performance-based mental imagery.
5. Add a physical movement or gesture to accompany the image.
6. Morph between metaphorical and biological imagery cues.
7. Add auditory cues like vocalized instructions, music, and other sounds.

[161] Ibid., 68.

[162] Ibid., 76.

[163] Ibid., 65–66.

[164] Ibid., 76.

Focus and distraction control refers to the ability to focus without interruption or handle distractions.[165] Total focus is required while performing complicated movements in dance, athletics, or the performing arts in order to maintain alignment.[166] It helps to start imagery sessions by focusing on breathing, as Franklin explains that the breath can indicate the state of your alignment and muscle tone. If the student or teacher notices their breathing slowing and deepening, the image is likely successful.[167] To help students improve their movement and alignment, guide them into narrowing their focus to a specific sense and imagine "turning up the volume" on the perceived sensations.[168]

6.4.2.8. Desired Outcome

Effective imagery occurs when the imagery outcome matches the original intent and function. The success of the imagery outcome depends on "(a) if what is imaged and how it is imaged is appropriate for the individual and the situation (i.e. meaningful imagery); and (b) the individual's ability to image."[169] However, the student may experience unexpected outcomes not related to the purpose of the imagery. Cumming and Williams warn that "incorrect or inappropriate use of imagery may elicit negative outcomes or no outcome."[170] Factors preventing imagery effectiveness include giving students too many images simultaneously, only using one image modality repeatedly without variation, not ensuring that students have the requisite

[165] Ibid., 76–79.

[166] Ibid., 83.

[167] Ibid., 7.

[168] Ibid., 68.

[169] Cumming and Williams, 78.

[170] Ibid., 76.

knowledge to understand anatomical images, giving students the desired imagery result rather than showing them how to recreate it on their own, and disregarding the associative learning stages of imagery.[171]

Both the student's mindset and mental state and the teacher's skill at teaching and providing imagery can influence the effectiveness of the imagery. Using positive or object mantras and self-talk helps when verbalizing imagery.[172] If a student finds themselves stuck with negative images, they can acknowledge the image and use mindful imagery to let go of the image. Franklin suggests imagining the negative image dissolving like a sugar cube in water or floating off into space like a balloon, or imagining what the opposite (positive) thought or image feels like.[173]

In order to retain progress with imagery work, Franklin makes the following suggestions:

1. Add in new movement habits gradually through repeated practice. Avoid frustration because the body may make progress in leaps between slow stages of learning. Imagery outcomes can feel weird or abnormal, even if positive changes are happening subconsciously due to "sensory confusion or disorientation," but they will eventually feel natural if the imagery is successful.
2. Recreate a positive experience by linking it to a tactile, kinesthetic, or visual image that can be easily recalled.

[171] Franklin, *Dynamic Alignment*, 84.

[172] Ibid., 73.

[173] Ibid., 77.

3. Keep recalling the image to help establish it in the subconscious.[174] Notes and drawings of positive imagery experiences can help with memory recall.[175]

Pavlik and Nordin-Bates note there may be some limitations to imagery effectiveness, as not all images or imagery principles have been studied in scientific settings. When determining imagery function and content, teachers and students should keep in mind that some imagery recommendations are based on personal experience—which researchers acknowledge is an important aspect of imagery research—and some imagery recommendations are research-driven. However, they argue that the PETTLEP checklist's recommendations for imagery "represent the most reliable in the published literature to date and should, therefore, be used in conjunction with dance guidelines to inform both how to image and image creation for research."[176]

6.4.3. PETTLEP Checklist

The PETTLEP checklist developed by researchers Paul Holmes and Dave Collins helps create motor imagery closely mimicking the actual activity in order to maximize mind-body benefits.[177] Holmes and Collins believe imagery should have a "functional equivalence" to the task being imaged, meaning that imagery should closely emulate the situation and physical,

[174] Ibid., 51–52.

[175] Ibid., 78.

[176] Pavlik and Nordin-Bates, 59–60.

[177] Ibid., 58.

emotional, and cognitive processes involved.[178] The seven elements comprising PETTLEP include physical position, environment, task, timing, learning, and emotion.

6.4.3.1. Physical

Practicing mental rehearsal imagery is more effective in a physical position that closely mimics the actual activity. Holmes and Collins note that beginning imagery exercises are often introduced in relaxed poses because of the therapeutic benefits of imagery, but this may not always work in performance situations for athletes who need to perform at higher energy levels because relaxation techniques can calm both the body and the mind.[179] However, Pavlik and Nordin-Bates observe that athletes tend to use imagery in a "static position or doing only minimal gestures," implying that Holmes and Collins are overgeneralizing or too limited in scope. In contrast, they find dancers use imagery both while dancing and prior to initiating movement in a "relaxation pose or quiet stance."[180] While Franklin agrees with Holmes and Collins that "participatory movement is useful for maintaining the brain's autonomic activation at a level appropriate to the task being imagined," he also argues that the physical nature of imagery is situational.[181] Franklin recommends cueing with biological imagery during movement when the goal is to improve movement performance, but to cue without movement when

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[178] Paul S. Holmes and Dave Collins, "The PETTLEP Approach to Motor Imagery: A Functional Equivalence Model for Sports Psychologists," *Journal of Applied Sport Psychology* 13, no. 1 (Oct. 2007): 62, https://doi.org/10.1080/10413200109339004.

[179] Ibid., 71–72.

[180] Pavlik and Nordin-Bates, 57

[181] Franklin, *Dynamic Alignment*, 78–79.

facilitating learning, creativity, or healing.[182] Non-movement imagery positions—like the constructive rest pose used in Alexander Technique, Yoga's corpse pose, and sitting in a cross-legged position or in a chair—allow the imager to focus on imagery without making any effort to keep the body in position. Franklin also encourages beginners to avoid standing work because the higher center of gravity is more unstable and because of the temptation to fall into old movement patterns.[183]

6.4.3.2. Environment

Performers should create as comprehensive a multi-sensory image of the environment as possible for mental rehearsal.[184] (For more on sensory images, see Imagery Types, Imagery Characteristics, and Imagery Ability.)

6.4.3.3. Task

Imagery techniques differ among skill-levels, meaning that advanced performers focus on different, often more complex aspects of the skill than beginners.[185] Similarly, dance teachers use imagery more often and with more complex images as students advance.[186]

6.4.3.4. Timing

Performers might use imagery for only a few seconds or as long as an evening when using mental rehearsal imagery. Musicians tend to image at similar speeds to real time or slightly

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[182] Ibid., 64.

[183] Ibid., 86–88.

[184] Holmes and Collins, 72.

[185] Ibid., 72–73.

[186] Pavlik and Nordin-Bates, 54.

slower when learning a new skill or repertoire.[187] This is in keeping with current imagery research, as both Franklin and Holmes and Collins stress the importance of keeping the temporal aspects of imagery as close to reality as possible for mental rehearsal. They note that mentally using slow-motion or freeze-frame techniques with an external visual perspective helps to learn new skills.[188] Similarly, these strategies can be used to improve biomechanical efficiency.[189]

6.4.3.5. Learning

Imagery content must adapt to reflect developmental stages of learning, meaning that as a motor skill—such as the left-hand fingering in a musical passage—improves in speed or technique, the image must incorporate those changes.[190]

6.4.3.6. Emotion

It is helpful to consider the emotional state of the performer under pressure and include it in mental rehearsal imagery.[191]

6.4.3.7. Perspective

Imagery can be viewed from an external perspective—visualizing yourself performing a movement as if you were an outside observer) or an internal perspective—kinesthetically feeling the movement from a first-person perspective. Imagery also can be described in terms of spatial

[187] Bowes, 267.

[188] Holmes and Collins, 74.

[189] Franklin, *Dynamic Alignment*, 76.

[190] Holmes and Collins, 74–75.

[191] Ibid., 75–76.

location: a specific (local) area or whole (global) area.[192] Table 8 shows examples of images with different combinations of perspectives and locations.

Table 8. Imagery Perspectives and Location Examples

Perspective/Location	Imagery Example
Internal-Global	Imagine the body filling up with a breath.
Internal-Local	Imagine the shoulders melting down the back.
External-Global	Imagine thunderous applause in the recital hall after a successful performance.
External-Local	Imagine a string lifting your spine from the top of your head.

Source: adapted from Eric Franklin, *The Art & Science of Cueing: Best Cueing Practices for Successfully Teaching Yoga, Pilates and Dance* (Minneapolis: OPTP, 2016), 43–49.

Motor learning research focuses on the theory of **attentional focus**, which explores where "performers should aim their attention while learning and performing muscular tasks."[193] The predominant view among researchers is that an external focus on the effect of the movement results in more successful and skilled performance than an internal focus of attention. Statements like "don't overthink" or "just do it" illustrate the principle of non-attention—not focusing on what is happening in the body while performing a task. Some researchers argue that an internal focus causes the performer to think too much and slow down their motor systems, which could negatively affect muscular effectiveness in terms of fluidity, accuracy, and speed. They worry

[192] Franklin, *Dynamic Alignment*, 60–62.

[193] Helding, 139.

that focusing on the mechanics of movement can actually cause faulty movement patterns to stabilize.[194]

Many musicians embrace the principle of non-attention, which has been popularized by bassist Barry Green's book with Timothy Gallwey, *The Inner Game of Music*, and Gallwey's *The Inner Game of Tennis*. However, Helding challenges if musicians actually know their muscular tension is caused by them overthinking or focusing on the internal mechanics of technique. She argues that there is a lack of concrete evidence proving that an external focus benefits musicians more than an internal focus, and that most research on motor learning study athletes doing simple physical tasks rather than performing artists. These studies cannot replicate the complexity of expert musical technique in performance settings.[195] In one of the few attentional focus studies on musicians, Michael Mentzel similarly finds inconclusive proof that an external focus on performing is more effective than an internal focus on breathing for adult novice singers.[196]

Recent sports psychology research suggests that imagery perspective may be task-specific.[197] One study found that an internal focus can be helpful when learning new motor skills.[198] This can be likewise extended to the remedial stages of learning technique. Violinists can begin mental rehearsal imagery with an internal perspective but also be prepared to switch

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[194] Ibid., 139

[195] Ibid., 142–146.

[196] Michael Mentzel, "The Effect of Attentional Focus on Singing Voice Quality: Towards the Interdisciplinary Experimental Investigation of Singing Pedagogy" (DMA diss., University of Maryland, College Park, 2016), 59–61, ProQuest Dissertations & Theses Global.

[197] Pavlik and Nordin-Bates, 58.

[198] Helding, 143.

between external and internal perspectives as needed.[199] Pavlik and Nordin-Bates observe that dancers use both internal and external imagery "in tandem in order to compare their experience of movement to what an onlooker might see."[200]

With this contradictory evidence, it is best for violinists to consider the specific functions and goals of their imagery when determining such characteristics as perspective and location.

6.4.4. Self-Cueing and Imagery

Self-cues can help students improve movement and technique in the practice room. One way to help students evaluate their own movement and to determine what cues and imagery to use is Franklin's **APAC (Assess, Plan, Act, Compare)** model:

Assess: first, evaluate posture to determine what normal alignment and movement looks like. Have the student ask themselves how they are doing mentally, physically, and emotionally and if there is room for improvement. However, if the student has any habitual incorrect alignment and movement patterns that feel normal, students should seek a postural expert for help.

Plan: next, devise a plan to improve movement and implement changes. This requires knowledge of how the body anatomically functions and how it gets new sensory information from the nervous system. Have the student ask themselves what tools they need to improve, what resources they currently have access to, and what resources or tools they might need to add before moving forward.

Act: the student uses imagery and embodied anatomy tools such as self-talk, self-touch, and metaphorical and anatomical imagery to change posture and alignment.

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[199] Holmes and Collins, 76–77.

[200] Pavlik and Nordin-Bates, 57–58.

Compare: afterwards, the student compares the new state of posture and alignment to their original observations and tendencies. It is helpful for studnets to record positive changes to keep track of their progression over time while continuing to revisit and review the APAC steps.[201]

Self-cues may have an external or internal focus, but both require knowledge of functional anatomy to be successful. Internal cues emphasize anatomical function like breathing and muscle use, whereas external cues indicate visual critical features of movement and alignment. Students using external self-cues benefit from the use of a mirror or video recording, but using a mirror to watch for externally focused cues like the level of the bow arm may cause students to distort their body position in order to see themselves in the mirror. Likewise, too much visual sensory information from the mirror or video recording can lead to feelings of overwhelm.

Beginning self-imagery and self-cueing sessions with preliminary body scans can help become aware of positive and negative thoughts that occur when thinking about the body. Simple self-talk and imagery like "my shoulders are relaxed" or "my trapezius muscles are melting down my back like butter" help gain familiarity with self-cueing. Franklin encourages eliminating distractions like watching television while exercising because it prevents the full experience of performing the movement, including any feelings of pain or fatigue, and therefore prevents one's ability to improve the movement. Although violinists rarely watch television while practicing, this advice comes into play during fitness and conditioning sessions or when practicing specific movement exercises away from the instrument.[202]

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[201] Franklin, *Dynamic Alignment*, 44–45.

[202] Franklin, *Cueing*, 18–19.

While providing students cues to use on their own is an essential part of teaching, guiding students to create their own intuitive imagery can empower them to become their own coach when not working regularly with a teacher.[203] Franklin argues that "no image suggested from another person is as tailored to your needs as the one you discover through personal experience."[204] To help students develop their self-cueing and imagery, give students a **seed image**, an easily comprehended programmed image that can develop into more personalized and intuitive images as they progress.[205] Once the student is comfortable with the seed image, they can use self-talk to figure out if there are more useful images or metaphors that could replace or grow from the original image.[206]

Commentary

Cueing is one of the most important methods for presenting information about motor skills.[207] While the sheer amount of information outlined in this chapter may appear overwhelming at first glance, it is helpful to remember that the goal of learning to use imagery and cue is not "to be a walking encyclopedia of imagery. The goal is to create economical and healthy movement and posture and to focus on the task at hand with a clear and open mind."[208] It is helpful to experiment with different types of cueing and imagery when working with individual students and in various situations. Teachers might consider keeping track of cues and

[203] Franklin, *Conditioning for Dance*, 24.

[204] Ibid., 32.

[205] Ibid., 25.

[206] Franklin, *Dynamic Alignment*, 7.

[207] Knudson, 89.

[208] Franklin, *Dynamic Alignment*, 85.

images that work during lessons and taking note of any effective cues and images used by other teachers in masterclasses and workshops. Cultivating your cueing skills should hopefully make teaching more creative and enjoyable.[209]

Developing a cueing repertoire is a lifetime process. The overviews, guidelines, checklists, and models introduced here offer a foundation for strengthening and developing this important pedagogical skill set. With repeated practice and experimentation, teachers can confidently and creatively cue in the applied violin lesson.

[209] Franklin, *Cueing*, 2.

Conclusion

This dissertation presents a handbook for research-based methods of teaching and evaluating healthy movement using the framework of Qualitative Movement Diagnosis (QMD) to help prepare violin students for careers in teaching. Many violinists may begin their teaching careers without a formal understanding of biomechanically healthy technique or effective teaching strategies. Ineffective communication and pedagogical inconsistencies may lead to students requiring remedial instruction or treatment for musculoskeletal injuries later in their violin studies and careers. It is essential for teachers to not only provide their students with biomechanically sound technique but to be able to identity and address longstanding problems with playing.

Analyzing Violin Technique Using QMD

QMD is a tool for diagnosing and fixing movement errors developed by academic researchers. It helps teachers examine and identify performance factors most important for helping students improve. As a multidisciplinary approach drawing from kinesiology, exercise pedagogy, psychology, and physiology, QMD is uniquely adaptable to movement-based disciplines, and therefore can easily extend to violin teaching. The 4 stages of QMD—preparation, observation, diagnostic evaluation, and intervention—offer a roadmap for analyzing the movements involved in violin technique.

The preparation stage of QMD offers an opportunity to establish and update a prerequisite base of knowledge of violin-playing, student characteristics and learning styles, and strategies for effective instruction. Teachers can benefit from critically examining their sources of knowledge and integrating in other types of knowledge such as anatomy, alignment, and functional movement patterns. Current collegiate violin pedagogy courses may be limited to

reading treatises with minimal guidance. Analyzing pedagogical treatises using principles of critical features, common errors, motor development sequences, and hierarchies of fundamental movement patterns provides new insights into different pedagogues' approaches and a systematic method for students reading treatises for the first time. Performance majors can also benefit from learning to tailor their instruction to individual students by studying pedagogical topics such as developmental stages of learning, child psychology, physiological traits and their effect on setup, and learning styles; and adopting context-specific teaching strategies prioritizing student-centered learning, developmentally appropriate sequencing, and holistic remediation.

During lessons, many violinists simultaneously observe and evaluate their students before providing feedback. QMD instead separates observation and diagnostic evaluation into two stages. The observational stage of QMD outlines suggestions for preparing systematic observational strategies tailored to specific scenarios, stages of the learning process, or technical or musical objectives. Teachers can more accurately analyze movement patterns by determining a scanning strategy, considering the most effective vantage point, using video technology, and repeating brief observations.

Music performance literature prioritizes self-evaluation skills and musical error-detection and overlooks the development of evaluation skills for the teacher. In the evaluation and diagnosis stage of QMD, violinists are encouraged to focus on critical features, incorporate biomechanical principles, and consider various sources of performance errors to more thoughtfully evaluate the performance. Violin pedagogues like Simon Fischer recommend diagnosing the intervention most likely to maximize improvement, but QMD offers multiple rationales that teachers can use to determine the best intervention going forward, including

finding an underlying error, addressing the easiest corrections, the base of support, or critical features first, and working within movement sequences.

Teachers have many options available for helping students improve their technique and movement during the intervention stage, including feedback, modeling, manual and mechanical guidance, training and conditioning, practice modifications, and attentional cueing. Violinists can improve their interventions by implementing motor learning findings from QMD, kinesiologists, and music pedagogy researchers. Because the QMD process is cyclical, teachers can begin the observation stage again to determine the effectiveness of the intervention and to make future corrections. Two essential tools in the intervention stage are cues and imagery. Teachers regularly use pedagogical cues and imagery to communicate information about technique and musicality, but violinists can benefit from current sports, dance, and vocal cueing and imagery research in order to provide more student-specific and biomechanically accurate information to improve movement.

Recommendations and Topics for Further Study

QMD's integrative, multidisciplinary approach can help reform violin pedagogy. As an academic tool, QMD can be integrated into existing collegiate pedagogical courses or help provide a structure for new curriculums to prepare students for teaching careers. Experienced teachers can also use the information presented in this document to evaluate their own teaching and determine areas of growth. They may be interested in self-evaluating their teaching using video recording or reflecting on their knowledge base, preferred styles of interventions, and frequently used pedagogical cues. Violinists can use the QMD process on their own in the practice room to observe their playing, evaluate and diagnose issues, and determine the best form of intervention.

Future studies can shine a light on current violin teachers' body of knowledge and pedagogical preferences. Possible topics include violinists' preferred pedagogical resources that they rely on for teaching technique and movement, such as treatises or outside resources like somatic methods or anatomy books; common errors, critical features, and cue words drawn from classic violin pedagogical treatises, and follow-up studies comparing them to the critical features, errors, and cues from somatic disciplines or anatomy resources; and surveys of popular evaluation topics and methods of intervention used by leading teachers and concert artists in video masterclasses available online. Other beneficial studies could include the most effective cues for violinists of different ages, experience levels, or learning styles, and collaborative work with kinesiology and biomechanical researchers identifying fundamental movement patterns and motor skills used in violin-playing.

Because many collegiate music institutions do not provide injury prevention resources or wellness courses, violinists must be responsible for educating themselves and their students about performance-related medical disorders (PRMDs), factors leading to injury, diagnosis and prevention strategies, and mind-body techniques like breathing exercises and imagery. Although some violinists may turn to somatic methods to learn about body awareness, basic patterns of movement and alignment, and how to play with less tension, not all students and teachers may know about or have easy access to somatic practitioners. Holistic violin teaching requires an understanding of functional anatomy, biomechanically healthy movement and technique, empathetic and learner-centered instruction, and effective teaching strategies to help students play enthusiastically without tension and pain. While violin pedagogues extensively discuss movement in terms of balance, alignment, and using the natural movements of the body to eliminate tension, they mostly explain them using various conceptual ideas lacking anatomical

and biomechanical specificity. Teachers also do not learn how to systematically evaluate and diagnose movement and technical issues.

Although there are many approaches to holistic music pedagogy and wellness, and no one system can provide all the answers, the principles of QMD offer new perspectives for thinking about violin teaching and movement. Incorporating systematic methods like QMD into traditional pedagogical courses can empower violinists to better teach and evaluate technique and ultimately help students play joyfully without pain.

Glossary

Anatomical cues: cues influencing muscle tone and posture that are realistic anatomical representations of body parts. A subset of **biological imagery**. (6.1.2.1 and 6.2.3.1)

Augmented feedback: information delivered from a teacher or other outside source like video. Also known as **extrinsic feedback**. Feedback can be delivered before, during (**concurrent feedback**), and after performance (**terminal feedback**) immediately or instantaneously. (5.1.2)

Autonomous feedback: sensory feedback received from the environment and one's personal experience of a movement (**proprioception**). Also known as **inherent** or **intrinsic feedback.** (5.1.1 and 6.1.2.3)

Automatic processing: a motor learning mode activating behaviors that can be done automatically. (6.1)

Ballistic movements: primarily unconscious movements caused by the brain directing certain muscles to complete a movement. (2.1.4.2)

Basic cues: performance cues encompassing technical execution details like fingerings and bowings. (6.1.1.2)

Bandwidth feedback: only providing feedback if the student is not meeting learning or performance expectations. (5.1.2)

Biological imagery: imagery comprising anatomical cues and biomechanical cues. (6.2.3.1)

Biomechanical cues: imagery cues describing movement and forces involved in moving, often combining visualizations and proprioception. (6.2.3.1)

Blocked practicing: practicing a skill, movement, or segment of music repeatedly before moving onto the next task. (5.5.2)

Bone rhythms: visual and kinesthetic images of the bones moving in counter-rotation to each other. Proposed by Eric Franklin. (3.1.2.2)

Common errors: well documented critical features that threaten the success or safety of a movement or technique. (3.1.3)

Cognitive cues: verbal descriptions of movement or technique. (6.1.3)

Controlled processing: a motor learning mode where behaviors are activated consciously. (6.1)

Correction complex: repeatedly giving negative feedback starting with "don't." (5.1.2)

Correlation: the relationship of the mind and body where muscles respond to mental commands. Introduced by Ivan Galamian in *Principles of Violin Playing and Teaching*. (2.1.2)

Critical features: key aspects of movement necessary for performance. Often defined by a **range of correctiveness**. (3.1.3)

Cue: a word or short phrase communicating information for facilitating or changing movement performance. (6.1)

Deliberate practice: use of effective, research-driven practice strategies and habits. (5.5.1)

Dynamic alignment: non-static alignment focusing on movement and biomechanical efficiency. (3.1.2.2)

Dynamic Neurocognitive Imagery: an imagery-based method combining movement exercises with imagery to improve body awareness, biomechanics, and create positive changes in movement and posture. Also known as the Franklin Method. Developed by Eric Franklin. (6.2.1)

Embodied anatomy: imagining parts of the body functioning within yourself. (6.2.1)

Ensemble cues: auditory or visual cues to communicate information to ensemble members while playing. (6.1.1.1)

Expressive cues: performance cues designating changes in musical emotion and feeling in the piece. (6.1.1.2)

Faded reinforcement principle: provide frequent feedback early on during instruction and less as the skill improves. (5.1.2)

Fundamental movement patterns: general types of movement. Can be broken down into **motor skills**, **techniques**, and **styles**. (3.1.2.3)

Goal imagery: a subset of motivational imagery that helps with the process of achieving goals. (6.2.2)

Guided imagery: narrated imagery used to promote healing and relaxation. (6.4.1)

Illusion of explanatory depth (IOED): a phenomenon where individuals with formal expertise in a topic overestimate their ability to explain concepts to learners. Also known as the "curse of expertise." (1.1)

Imagery: cognitively creating an experience in the mind without external movement or action. (6.2)

Imagery characteristics: components of imagery, including sensory modalities, visual perspective, viewing angle, speed, duration, and frequency. (6.4.2.6)

Imagery content: what is being imaged. (6.4.2.3)

Imagery function: the purpose of the imagery. (6.4.2.3)

Imagery strings: metaphorical cues delivered in succession. (6.2.3.2)

Interpretive cues: performance cues highlighting aspects of interpretation, like tempo changes and dynamics. (6.1.1.2)

Intuitive imagery: spontaneously created imagery. Also known as **spontaneous imagery**. (6.4.1)

Kinematic imagery: imagery focusing on the actual movement of bones and other parts of the body. (6.2.3.1)

Kinetic imagery: imagery focusing on the forces involved in movement. (6.2.3.1)

Knowledge of results: feedback communicating the outcome of the performance. (5.1.2)

Knowledge of performance: feedback communicating information about the movement or technique leading to the performance outcome. (5.1.2)

Learner-centered teaching: a style of teaching emphasizing student growth and collaborative learning. (3.3.3)

Manual guidance: holding or moving a student's body into specific positions to help them kinesthetically experience the movement. Also known as **manipulation**. (5.3.1)

Mastery imagery: a subset of motivational imagery helping with performance preparation and anxiety, planning, focus, and motivation. (6.2.2)

Mechanical guidance: using devices or teaching aids to approximate movement. (5.3.2)

Mental rehearsal: mentally imaging a performance without external movement or activity. Also known as **mental simulation of movement** (MSM) or **mental imagery**. (6.2.2)

Mechanical method of evaluation: evaluating motor skills using critical features based on mechanical or biomechanical principles. (4.2.2)

Metaphorical cues: metaphor and analogy-based cues used to influence movement dynamics. A subset of **metaphorical imagery**. (6.1.2.1)

Metaphorical imagery: imagery using metaphors. Can be used to support other kinds of imagery. (6.2.3.2)

Metastrategies: learning about, planning, and using strategies for practicing. (5.5.1)

Miscues: incorrect or misinterpreted cues. (6.3.4)

Modeling: demonstrating a concept. (5.2)

Morphing imagery: alternating between anatomical and metaphorical images before, during, or after a movement. (6.2.3.3)

Motivational cues: cues enhancing how it feels to perform a movement. (6.1.2.1)

Motivational imagery: imagery influencing emotions and moods, goal achievement, confidence, and activation in the body. (6.2.2)

Motor imagery: imagery improving movement through mental rehearsal. Also known as **technique imagery** and **cognitive-specific imagery**. Franklin distinguishes between **motor-general imagery**, which improves general biomechanical efficiency, and **motor-specific imagery**, which improves a task-specific activity. (6.2.2)

Movement effectiveness: concerns movement speed, accuracy, and consistency. (6.1)

Movement efficiency: concerns moving with as little energy as possible. Also known as **muscular efficiency**. (6.1)

Movement performance cues: cues influencing aspects of movement. (6.1.2.1)

Musical performance cues: cues assisting with memory retrieval during performance. Also known as **sound cues**. (6.1.1.2)

Negative reinforcement: feedback reducing the frequency of errors and unwanted behaviors. (5.1.2)

Pedagogical cues: cues delivered by for educational purposes to communicate information to teach or modify a technique, movement, or musical aspect. (6.1.1.3)

Performance shifts: short-term improvement or decline in performance. (5)

Plasticity: the brain's ability to adapt. (6.2.1)

Positive reinforcement: feedback encouraging successful aspects of technique. (5.1.2)

Prescriptive cueing: teacher-led cueing. Can be related to **prescriptive imagery**. (6.1.2.1)

Programmed imagery: imagery delivered by a teacher in an instructional setting. Also known as **prescriptive imagery** or **deliberate imagery**. (6.4.1)

PRMD: Performance-Related Musculoskeletal Disorders. (2.2)

Proactive interference: the process of the body relearning or changing an established posture or movement. An element of **remedial pedagogy**. (2.1.1)

Procedural knowledge: knowing how to do something proficiently but not necessarily how to explain it. (3.3.2)

Proportions: fine adjustments of technical elements like bow speed, pressure, and contact point where one adjustment proportionally affects the other elements. Described by Simon Fischer. (3.1.3.1)

Propositional knowledge: knowing how to explain something but not necessarily able to perform it. (3.3.2)

Qualitative Movement Diagnosis: a kinesiological framework for evaluating and diagnosing movement errors. Comprises four stages (preparation, observation, evaluation and diagnosis, and intervention). (1.2)

Random practicing: breaking practice blocks into smaller units and alternating between units. (5.5.2)

Range of Correctiveness: the acceptable range of variation in critical features. (3.1.3.2)

Rapport: elements contributing to positive teacher-student relationships. (3.3.3.3)

Remedial pedagogy: a process where students relearn fundamental techniques and movement patterns. (2.1.8)

Self-cueing: providing oneself information to move or perform a technique more effectively. Also known as **attentional cueing**. (5.6 and 6.1.2.3)

Sensory imagery: imagery incorporating sensory detail, such as visual, auditory, and kinesthetic imagery. (6.2.3.4)

Sequential method of evaluation: comparing body positions and movements to a mental image of the expected position or movement. (4.2.2)

Structural cues: performance cues outlining significant moments in the formal structure, such as the end of the exposition or a change in key. (6.1.1.2)

Student-centered cueing: guided processes helping students determine useful feedback during and after performance. (6.1.2.2)

Summary feedback: delivering feedback after the student experiments with different processes or solutions. (5.1.2)

Systematic observational strategy: a strategy determining what to focus on and how to observe during performance. (4.1.2)

Tactile cueing: information about movement transmitted through touch. Also known as **haptic information transfer**. (6.1.3)

Three associative stages of motor learning: the **cognitive** stage (where the teacher guides the student in understanding the imagery and desired result), the **processing** or **associative** stage (where the student internalizes the image with support from the teacher), and the **application** stage where the student successfully uses the image independently. (6.4)

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