Body and Bass: Unlocking Greater Potential Through Awareness, Mindfulness, and Physicality

by

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ABSTRACT

The double bass, with its substantial size, thick strings, and awkward weight distribution, presents ergonomic challenges for bassists. These features make it difficult to maneuver and can put individuals into uncomfortable positions, especially while performing in the extremities of the instrument. Comfortable, full body engagement is required to achieve a well-rounded sound, but this aspect is often neglected, leading to an increased risk of tension buildup, strain, or injury. Awareness and knowledge of human anatomy and physical capability should be explored by bassists to assist in their career progression and longevity. Concepts from the Alexander Technique and Body Mapping are key resources for unlocking this potential. F.M. Alexander's discoveries can help a bassist to achieve balance and alignment in their body, while Body Mapping enhances awareness of the body's structure and capabilities. Together, these ideas make it possible for one to constructively address and adapt their playing from a physically orientated standpoint.

Anatomical, kinesthetic, physiological, and psychological aspects – with influence informed by a sports athlete's perspective – will also be discussed. These ideas can increase the efficacy and growth of a player while also decreasing the likelihood of sustaining or prolonging an injury. In the unfortunate likelihood that one experiences an injury, a return-to-play plan can be implemented to help speed recovery, reducing the amount of time spent away from the instrument.

This paper is written from the perspective of a double bassist who uses a French bow and plays in a seated position.

DISCLOSURE STATEMENT

Opinions discussed in this paper are derived from personal experience and research. The information provided here should not be used as a substitute for medical advice. It is always recommended to consult a qualified healthcare professional for any physical or mental medical concerns. If one is experiencing any troubling or life-threatening health-related issues, please seek professional medical advice.

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Introduction

Playing the double bass requires a high level of physical activity. From the moment the instrument is unpacked to the vibrato placed on the last note in a phrase, a musician's body is in motion. This means that making music can only happen when the body's many anatomical components are constantly and precisely working together. Conscious engagement of the body and mind is required to produce a quality sound. While this idea has been explored within the double bass community, a more accessible, detailed consideration is required due to the many positive benefits it has to offer.

Many professional musicians develop an effective approach to using their body once they recognize their physical design and capabilities, as this enables them to navigate their instrument more efficiently. The length of this process is determined by the amount of time spent developing one's body use and awareness, natural-born talent, and instruction from a teacher. The teacher variable is the most important, as they can encourage one to explore these ideas. However, their effectiveness depends on the depth of their understanding in this field, as presenting misinterpreted or incomplete ideas could confuse students. It is imperative that bassists continue drawing attention to utilizing their bodies more appropriately while performing as its positive impact could transform one's quality of playing.

The human body is a complex and highly organized structure; therefore, it is important to understand its capabilities and functions. This can be achieved by understanding more about anatomical structure and kinesthetic capabilities. Anatomical knowledge can serve as a resource in identifying specific and relevant areas within the

body. For example, knowing that hips and hip joints are different structures may better inform a bassist on where to bend from when playing in thumb position, as many people confuse their hip joints with the top of the pelvis where there is no joint. Kinesthetic familiarity helps one to understand the body's movement capabilities. Developing this knowledge can help with establishing physical awareness in the body, which, when employed, can maximize a player's ability to draw out the full sound of an instrument. This essential lesson can also be used by double bassists to decrease the risk of injury. With a weight of as much as 50 pounds and a height of nearly six feet tall, it is common for players to contort their body to achieve a more desirable sound. The unergonomic design of the instrument can make it difficult to fit each individual's body size and shape. But by developing the senses to be more physically oriented it is possible to achieve comfort while playing. Learning how to listen to the body's internal signals and how to physically adjust oneself accordingly is a useful skill in moments of discomfort. Playing with comfort should always be a high priority for musicians, and this becomes possible by establishing sensible and practical principles that derive from the Alexander Technique and Body Mapping.

Throughout history, humans have engaged in athletic pursuits as a means to demonstrate strength and skill in different fields, and only the most talented individuals rise to become professional competitors. To reach this peak level of performance, athletes train physically and mentally to be unphased by any potential trial they might face. Musicians have a lot in common with athletes in this respect, as their goal is to entertain audiences, regardless of any internal or external challenges, and this peak level of

expertise can only be achieved through practicing. However, athletes are more diligent at reaching their peak level due to the plans they create before beginning each of their exercise routines. Creating a structured, detail-oriented plan ahead of time minimizes the physical strain on the body while maximizing efficiency. While many musicians create a plan during their practice session, they need to mimic and adopt this more disciplined routine before beginning for better results.

Creating a structured, detail-oriented plan in advance helps minimize physical strain put on the body from performing, while maximizing efficiency. Therefore, musicians should adopt or enhance this level of structure and discipline in their practice lifestyle, given the growth potential it offers.

Musicians should also consider establishing a physical routine that emphasizes developing functional strength. This could include training the endurance of key areas in the body involved with playing an instrument. Engaging in and following through with an exercise plan can also lead to an improved level of physical and mental health, which needs to be encouraged more within the music community as these traits are often neglected. More details surrounding this idea will be explored later in this paper.

Developing a strong psychological state can lead to mental resilience, which grants one the capability of withstanding a variety of issues. Structuring practice sessions similarly to an athlete's model is an example of this, but this also includes learning techniques to navigate through anxiety. Additionally, cultivating mindfulness through reflective practices, such as meditation and mantras, can allow one to musically prepare

for events even without their instrument. Constructive and practical exercises to support this concept will be explored to help demonstrate its importance.

Linking physiological and psychological elements together is essential for establishing a mind and body connection. Although the body can be separated into sections, it should be treated as one, interconnected unit. When approached in this manner, one is more likely to enhance their method towards playing their instrument. In addition, establishing this mindful connection and practicing techniques designed to instill calmness, such as specialized breathing, may decrease the likelihood of sustaining an injury.

Musicians are at risk of injury—double bassists perhaps more so—when one uses their body inefficiently. Listening to the body's needs through a well-informed and mindful connection promotes comfort, which should be a top priority for musicians striving to create a rich and full musical sound.

Injuries can be debilitating physically and mentally. Strategies to encourage musical growth during periods of recovery and a return-to-play plan are necessary during these periods of downtime. Each person may manifest an injury in a different fashion; discovering the most appropriate solution will take time. Recovering from and preventing possible future flare ups of an injury should be the primary goal of an injured musician.

MIND AND BODY

The body is an interconnected and complex organism that is often not fully understood by individuals outside of the medical profession. Most musicians fall into the category of not being medically trained, leading them to overlook the body's capabilities. However, viewing the body holistically is a valuable concept to consider for those desiring musical improvement. A narrow mindset or focus does not necessarily hinder one from growing, but there is expandable potential to one's growth by drawing awareness to the connection of the mind and body. It is widely established that the body has five senses, each designated with their own function. However, this set of traits neglects movement, which is an integral part of daily life. Updating the five senses to include kinesthesia when considering the mind-body connection is critical. The implications of this connection can be explored through the lenses of the Alexander Technique and Body Mapping.

THE ALEXANDER TECHNIQUE

FREDERICK MATTHIAS ALEXANDER (1869-1955)

Frederick Matthias Alexander (F.M. Alexander) was a Tasmanian-born actor who was responsible for creating what is now known as the Alexander Technique, "a simple and practical method for improving ease and freedom of movement, balance, support, flexibility, and co- ordination."[1] To better understand the principles of this practice, it is helpful to learn more about Alexander's life and the discoveries he made along the way.

[1] Barbara Conable and William Conable, *How to Learn the Alexander Technique* 3rd ed. (Portland, OR: Andover Press, 1995), 1-18.

In his early years as a stage orator, Alexander began experiencing recurring episodes of laryngitis. Doctors could not discover the reason for his loss of voice and prescribed vocal rest in the hopes of his voice returning. Upon regaining his voice, Alexander would return to the stage only to lose his voice again. This repeated cycle viciously took over Alexander's career as a performer and led him to take matters into his own hands.

Alexander conducted a thorough investigation of his physical habits, using mirrors to observe himself from various angles. Through this exploration, he discovered a recurring pattern in which he habitually extended his neck away from his body while performing. This unconscious movement created tension in his neck, which he would later term "Downward Pull," an interfering pattern of tension that disrupts the body's ability to maintain equilibrium.[2] The tension not only affected his neck but also placed pressure on his larynx, leading to his recurring loss of voice. By recognizing this pattern, Alexander began addressing the tension and working to restore balance to his body.

With this promising lead, Alexander then set out to find a solution that would address this habit. This included him studying the most ergonomic ways to stand, speak, and breathe. In his attempts to prevent his habit, a visual glance would show him that his kinesthetic sense was unreliable, as his body was unaligned. Presumably frustrated after having finally discovered the root of his problem but not a solution, he returned to his notes looking for an answer.

[2] Ibid, 1-18.

After some reflection, Alexander discerned an idea that he later termed inhibition. The definition he used for this word revolved around the concept that undoing the wrong thing is sometimes more practical than trying to do the right thing. Even with good intentions to correct or adjust a habit, it is more useful to instead undo or unlearn it. Alexander's open-minded approach allowed him to make this discovery. He used to say, "Everyone wants to be right, but no one stops to consider if their idea of right is right" (attributed to Alexander, source not found).[3] This means that it is important to constantly question the correctness of one's own intuition as alternative perspectives and processes may yield a more refined answer.

Alexander's long period of self-study and curiosity led to the creation of a process that allowed him to return to the performance stage. His story and success spread worldwide throughout the acting community and led to him developing a following of people experiencing similar vocal issues seeking his assistance. Alexander decided that he wanted to help others by educating them in his findings. This eventually resulted in his performance career being overtaken by his newfound teaching career. Alexander made his discoveries more concise and accessible by publishing his research into articles and books and began privately teaching individuals around the world. Along with his publications, his teachings have been well documented by his followers and his efforts well recognized by prominent scientists of the time.[4] Additionally, more recent, modern

[3] James Brody, AmSAT, "Music Wellness Lecture: F.M. Alexander," (presentation, University of Colorado Boulder, Boulder, CO, February 1, 2024).
[4] Jennifer Schulz, "Who Was F.M. Alexander?" *Presence and Poise*, accessed August 16, 2024, https://presenceandpoise.com/who-was-fm-alexander/.

scientific investigation has proven his work in this field to be substantive. After his passing in 1955, his followers and successors continued his legacy by expanding on his research and applying it to different fields within the arts.

ALEXANDER'S DISCOVERIES

Alexander's principles, also known as his discoveries, are arranged into three core concepts: Primary Control, Downward Pull, and Constructive Conscious Control.[5] Barbara Conable interpreted these definitions in her book, *How to Learn the Alexander Technique*,[6] and have been updated for the purpose of this paper:

> **Primary Control** is the natural mechanism for maintaining equilibrium, in terms of balance and support, within the body, ensuring that upright stability is effortless, and movements are graceful and efficient. It is also dependent on the dynamic relationship between the head and the spine while in movement or stationery.
>
> **Downward Pull** is the interfering pattern of tension on the intrinsic sources of maintaining equilibrium throughout the body, that ultimately compromise the action of Primary Control. It inhibits or diminishes the user from all dynamic relationships associated with their movements or uprightness.

[5] F.M. Alexander, *The Use of the Self*, 2nd ed. (New York: Schocken Books, 1974), 21-39; F.M Alexander, *The Universal Constant in Living*, 3rd ed. (London: Chaterson Ltd., 1946), 42-61.
[6] Conable, *Learn the Alexander Technique,* 1-18.

Constructive Conscious Control is the ability to knowingly inhibit the pattern of Downward Pull and allow the facilitation of Primary Control in the efforts of recovering grace and poise in movement and ease in sitting or standing.

Conable later went on to re-imagine Alexander's principles as "Laws of Human Movement" and, in a scientific sense, can be divided twofold.[7] These laws have been slightly updated without changing their overall meaning:

I. Habituated tensing of the neck muscles results in a predictable and inevitable tensing of the whole body. Release of tension in the body must begin with the release of tension in the neck.

II. When movement is free, the head leads and the body follows. More particularly, the head (or skull*) leads and the spine follows in sequence.

***Note:** To better understand the relationship between the head and the spine, Amy Likar, Director of Training and Sponsoring Teacher of the Association for Body Mapping Education, iterates the skull instead of the head. Doing so helps to emphasize the importance of the atlanto-occipital (AO) joint. The second part of the second law of Conable's Laws of Human Movement can then be re-imagined to, "when the skull leads the spine will follow in sequence."[8]

[7] Conable, *Learn the Alexander Technique,* 1-18.
[8] Amy Likar, "ABME: What Every Musician Needs to Know About the Body," (presentation, 29th Annual Alexander Technique (Plus) Summer Program, University of Colorado Boulder, Boulder, CO, July 2024.

These ideas can be adapted and applied to double bassists with the goal being to demonstrate their importance and how using these principles while performing can assist in creating a desirable sound while avoiding injury.

HOW THE ALEXANDER TECHNIQUE HELPS BASSISTS

The Alexander Technique can be used as a tool by double bassists to develop a stronger awareness of correcting and adjusting their setup and playing position. The instrument's unergonomic shape creates many variables that encourage bodily contortion, putting players into disadvantageous positions. Observation of the three principles denoted by F.M. Alexander, while accessing the first and engaging the third, allows the user to obtain balance and comfort in their body.

Lack of whole-body engagement and awareness can lead to postural issues, often caused by the misalignment of the body's six balance points. These balance points, a concept from Body Mapping, are useful in conjunction of the Alexander Technique. They are located at the AO joint, shoulder joints, lumbar spine, hip joints, knee joints, and ankle joints (Figure 1).[9] Arguably, the most important of these balance joints is the AO joint, due to the dynamic relationship between the head and the spine.

Downward Pull can impact the entire body as it could cause the balance points to become misaligned. Since the body operates as an interconnected system, this alignment

[9] Likar, "Musician Know About Body," July 2024.

issue can lead to negative effects. For instance, Downward Pull may cause the spine to bend, potentially resulting in pelvic rotation. This rotation can place strain on the psoas muscle, which connects the lumbar spine to the inner thigh. Such strain may diminish the diaphragm's efficiency, reducing breathing capacity, increasing stress levels, and possibly cause tension to develop in the arms and or other areas of the body.[10]

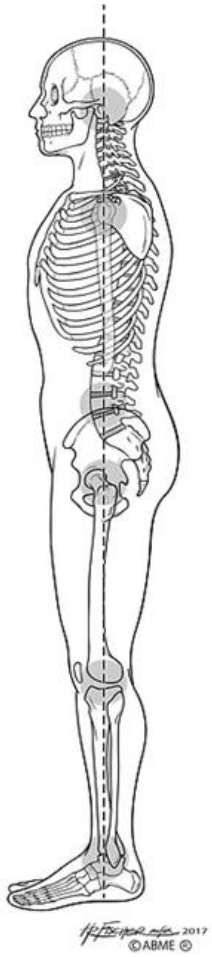

Figure 1: Six Balance Points of the Body. Drawing by Holly Fischer, 2017. Commissioned by ABME.

[10] Likar, "Musician Know About Body," 2024.

Accessing Primary Control enables one to achieve a stable and supported spine, whether sitting or standing. However, if Downward Pull is present, then inhibiting this pattern through Constructive Conscious Control becomes necessary. Fostering beneficial alignment between the head and spine maximizes the body's potential by enhancing one's coordination and engagement of various groups of muscles. Breathing also becomes more optimized as this alignment allows one access to the lungs' full capacity, which, when utilized, can positively influence one's psychological performance level. Additionally, it helps to minimize unwanted tension throughout the body.

Conable's iteration of "the head leads, and the body follows" serves as a reminder that the head is the command center for everything in the body but cannot act in this manner when Downward Pull interferes with maximal functioning. Focusing on the six balance points, with extra attention towards the AO joint, provides a foundation for double bassists to achieve greater comfort in their playing. When properly aligned, this balance enables a player to perform the full-body movements essential for playing the instrument.

BODY MAPPING

Body Mapping is a concept created by Barbara and William Conable in the 1970s that was initially used to help musicians understand the anatomical structure and capabilities of the body. This practice has influence from worldwide traditions and studies that date as far back as 5,000 years. These ancient practices include the Chinese medicine of acupuncture and acupressure and the Indian practices of yoga and ayurveda. More

recently, 20th century research has put an emphasis on physiological and psychological factors within the body, leading to the development of studies of psychosomatic medicine, bioenergetics, and somatic psychology. However, the dominating contribution for the creation of Body Mapping comes from the Alexander Technique.

Barbara Conable and William Conable's main goal for developing Body Mapping was to help musicians alleviate or prevent pain while playing their instrument(s). The foundation of their work was developed around the principles of the Alexander Technique, which was taught to them by Marjorie Barstow, who was trained by Alexander. Influences from Barbara's private practice and William's position teaching cello at The Ohio State University provided them with the possibility to thoroughly explore their ideas with their students. Through their patience and efforts, the practice evolved into an institutionalized system and continues to attract a growing following. Body Mapping is now practiced and taught internationally and has greatly helped many musicians.[11]

HOW TO LEARN BODY MAPPING

Body Mapping is the conscious correcting and refining of the body map to find graceful and coordinated movement.[12] A body map is the holistic, self-representation of one's structure, function, and size created in one's mind.[13] Developing these self-reflected

[11] Jennifer Johnson, "Body Mapping," *Jennifer Johnson*, accessed August 20, 2024, https://jennifer-johnson.co/body-mapping/.
[12] Barbara Conable and Bridget Jankowski, eds., *What Every Musician Needs to Know About the Body*, revised ed. (Chicago: GIA Publications, 2023), 17.
[13] Ibid, 17.

conceptions is achieved through anatomical education, self-palpation, and engaging in activities designed to better inform oneself of their unique physical design. "If one's map is good, one's movement will be easy and efficient. If one's map is inaccurate, one's movement will be affected accordingly" (Jankowski, 18).[14]* Musicians who practice Body Mapping will enhance their playing by improving and refining their perception and utilization of their physical self.

By becoming educated in basic anatomical principles, it becomes easier for these self-reflected conceptions to become more complete and accurate. "There is power in information" (Conable),[15] so by being well-informed and applying this knowledge to one's own self-exploration, one can consciously better guide themself physically and mentally while performing. The level of anatomical knowledge does not necessarily need to be so complex that could confuse an individual, but it also needs to be at a level that allows one to make constructive decisions more easily. When approached intentionally and effectively, comfort and enhanced playing ability become more attainable.

Many people have already started creating their own body map just by performing everyday tasks, such as turning a doorknob, or more complicated tasks, such as jogging. However, these actions, when utilized frequently, eventually are performed subconsciously, meaning that the brain has learned this action and is executing it

***Note:** This quote has been changed from a first-person to a third-person perspective.

[14] Ibid, 18.
[15] Barbara Conable, "ABME Home Page," *Association for Body Mapping Education*, accessed August 20, 2024, https://abme.wildapricot.org/.

automatically. As a result, this autopilot “behavior” can prevent one from actively improving and understanding their body map and potentially lead to the development of inaccuracies. These errors are often demonstrated by having individuals draw a full body portrait of themselves. Disregarding the level of artistry, the results generally demonstrate that areas of the body are missing or misrepresented. For example, the joints might not be depicted, resulting in a rigid representation, or there might be features that are not shown, such as the nose and ears. This shows that the individual has a misconception about the true design of their body. However, one’s inaccurate self-representation can be corrected through practice and experience.

The anatomical education part of body mapping is often taught using 3D models, photos, videos, and self-palpation. Looking at imagery while physically exploring the area allows one to become more informed about the structure of their own body. When applying this knowledge directly to one’s playing, it becomes easier for musicians to identify and address specific areas that may require adjustments or corrections.

HOW TO USE BODY MAPPNG

Body Mapping is a valuable tool for gaining a deeper understanding of the entire body. In this paper, however, the focus will be on five specific areas. Each section will explore how to develop greater awareness of these parts and their significance in playing the double bass. To emphasize the interconnectedness of the body, each section, except for the pelvis, pairs with at least one other related area. The five sections are:

1. Hands and Wrists
2. Arms and Shoulders
3. Head, Neck, and Spine
4. Torso (Back and Abdomen)
5. Pelvis

This structure highlights the intricate relationships between these regions and their role in mastering the instrument.

HANDS AND WRISTS

The hands and wrists are complex structures located at the extremities of the arms. They enable humans to perform a variety of tasks, such as using pizzicato to produce a pitch from a double bass. This basic knowledge will serve as a foundational starting point for a deeper exploration of the anatomical structure and layout of these parts of the body.

The hands consist of the fingers and palms and have a unique skeletal structure (Figure 2). The fingers are divided into three segments of bone called phalanges. Each segment of bone meets at a joint, which are points where the skeletal structure meets. The fingers have three joints in total, with the knuckles—also known as the metacarpophalangeal joints (MP)—serving as the connection between the fingers and the palm.[16] The thumb, in contrast, has only two phalanges and two joints, making it structurally different from the fingers and its opposable functions distinguishes humans from most mammals.

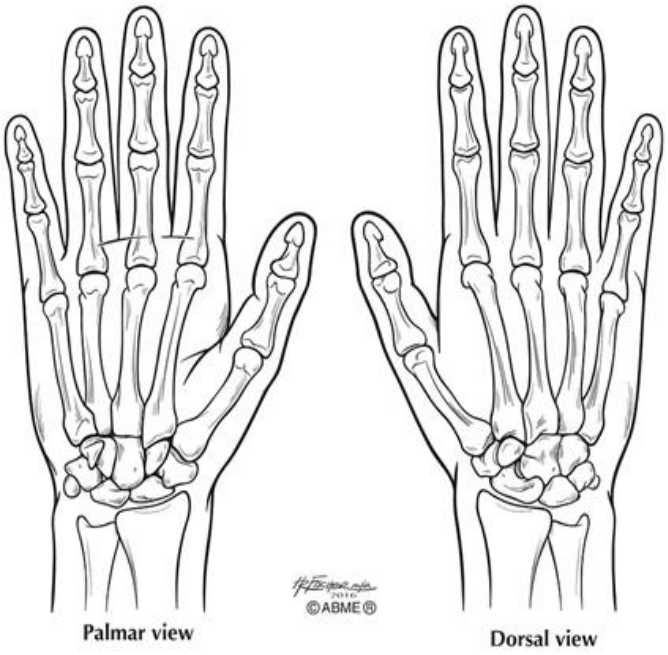

Figure 2: Bones of the Right Hand and Wrist. Drawing by Holly Fischer, 2016. Commissioned by ABME.

[16] Kenhub, "Muscles of the Hand: Learning Course," *KenHub*, accessed August 21, 2024, https://www.kenhub.com/en/study/hand-muscles; Kenhub, "Ligaments of the Wrist and Hand: Learning Course," *KenHub*, accessed August 21, 2024, https://www.kenhub.com/en/study/carpal-bones.

The fingers and thumb are supported by tendons and ligaments. These fibers work together to stabilize the joints and provide mobility.[17] The intrinsic and extrinsic muscles responsible for moving the fingers are located in the palm and forearm.[18] Intrinsic muscles control fine motor skills, while extrinsic muscles handle gross motor movements. Together, these muscle groups enable musicians to play their instruments.

The palms of the hands contain metacarpal bones that support the hand's structure and house small muscles responsible for fine motor movements. Each finger and the thumb have their own metacarpal bone, connecting to their own MP joint. These metacarpals are surrounded by three groups of intrinsic muscles, each with different functions that allow musicians to perform with precision.[19]

The wrist consists of eight small carpal bones, which, in the best circumstances, glide smoothly against each other and are surrounded by a network of tendons, ligaments, and muscles. The shape of each carpal bone facilitates mobility and acts as a connection point for the tendons, ligaments, and nerves leading to the forearm and hand.[20] Unfortunately, many musicians become familiar with the carpal and ulnar nerves in the arm through injury, as both nerves run through the wrist and pain can result when they are compressed for prolonged periods.

[17] Kenhub, "Bones of the Wrist and Hand: Learning Course," *KenHub*, accessed August 21, 2024, https://www.kenhub.com/en/study/hand-bones-and-ligaments.
[18] KenHub, "Wrist and Hand Ligaments," accessed 2024.
[19] Ibid.
[20] KenHub, "Muscles of the Hand," accessed 2024.

EXPLORING THE HANDS AND WRISTS

Palpate the hands referencing the provided image. Locate the bones and muscles, even in the smaller spaces between the metacarpals. Tendons and ligaments are generally more difficult to locate, but some of the tendons in the hand can be felt by hyper-extending the fingers.

Move the hands by opening and closing the fingers separately and in unison to get a better idea of their structure. The wrist's range of motion can be explored through movements such as flexing, extending, and deviating. Notice how the bones in the wrist glide smoothly against each other by placing one's fingers on the opposite wrist during these movements. Performing these simple actions will help update one's body map and expand one's understanding of how this area of the body functions.

HOW DOES THIS HELP BASSISTS?

The thumb's opposable capability is a crucial feature that enables humans to engage in a vast array of activity, including playing an instrument. For bassists, it grants them the mobility necessary to perform tasks such as managing the bow during a variety of strokes. While the importance of the thumb is subconsciously ingrained in the mind, it requires more conscious attention to maintain its health and protect it from injury.

In the French bow grip, it is common to inadvertently lock or collapse the joints of the fingers and thumb. A locked or collapsed thumb joint can lead to strain or discomfort,

which may affect a bassist's technique and overall hand health. In the right hand, both of these unfavorable positions for the thumb joints are typically caused by one's lack of awareness regarding their bow grip or from a fear of dropping the bow. By understanding the thumb's natural capabilities while maintaining a bow grip, it is possible to adjust it into a more appropriate position based on the anatomical points discussed earlier.

One of the easiest ways to identify if the thumb joints are locked or collapsed is through visual identification. If the skin surrounding the joint is tight or discolored, this is a strong indication of incorrect joint usage. Another way to identify if the thumb is not in an ergonomic position is by noticing if there is any discomfort around its joints. Shaking or stretching out the hand during a practice indicates a need to relieve the buildup of tension, which often appears in the muscle between the first finger and thumb's metacarpal. Correcting this thumb positioning can be achieved by revisiting the fundamentals of the French bow grip and periodically checking that one's thumb has not reverted to previous habits during playing.

Without the bow in hand, you can lift and support the right arm using the left hand at the forearm. The natural, relaxed position the right hand drops into is an ideal starting point for the French bow grip. Remove the left arm and have it place the bow in the right hand. The frog should rest in the palm of the hand, with the fingers wrapped around the stick of the bow. The thumb should make contact at the thumb seat or throat of the frog, depending on your grip style. The goal should be to hold the bow with the least amount of tension in the fingers and thumb, without dropping it.*

Once the bow is gripped in a structured and relaxed way, comfort becomes more achievable through mindful and consistent practice. If tension starts to build up again, it is helpful to pause the exercise before repeating it as this encourages the brain to develop a more beneficial habit. A structured, tension-free bow grip makes it easier to transfer the weight of the arm into the string, which in turn enhances performance characteristics, such as playing with a fuller sound.

JOINT HYPERMOBILITY

A joint's characteristics are largely determined by genetics. One condition that can affect a musician's development is joint hypermobility (JH), a genetic disorder in which the ligaments surrounding the joints are abnormally loose. Individuals affected by this typically have an increased range of motion that surpasses normal limits.[21] JH affects over 20% of the population and is often referred to as "double-jointed."* However, according to Dr. Michael Star, MD, "Everybody has a different level of flexibility. For example, dancers and gymnasts can bend over backward — and then there's me, who can't even touch the floor… It's all on the mobility spectrum. Hypermobility is just at one end of it."[22]

***Note:** It is recommended to practice this exercise over a soft surface to avoid damaging the bow in case it is dropped.

[21] NHS, "Joint Hypermobility Syndrome," *National Health Services: United Kingdom*, last reviewed August 30, 2023, https://www.nhs.uk/conditions/joint-hypermobility-syndrome/.
[22] Cleveland Clinic, "Joint Hypermobility Syndrome," *Cleveland Clinic*, last reviewed September 9, 2021, https://my.clevelandclinic.org/health/diseases/21763-joint-hypermobility-syndrome.

If a bassist has JH, their hands and fingers are likely to be affected. One issue from this extra mobility can be seen in the collapse of the second joint of the finger(s). It is commonly seen in the third and fourth fingers of the left hand, due to their relative weakness when compared to the first and second fingers. This loss of structural curve can lead to problems with intonation, vibrato, and overall mobility on the bass, and can also impose the same or similar issues on many other instruments.

Loose joints caused by JH can be reduced by building the endurance and functional strength of the finger joints through training the supporting muscles, ligaments, and tendons, but improper training could result in diminishing returns to one's finger spring tension or injury. This idea will be further discussed later. Additionally, JH can be addressed with devices that assist in supporting the curve of the fingers while playing. Such equipment should only be used temporarily, as the final goal is to increase the functionality of the joints without the assistance of tools.

LEFT-HAND POSITIONING AND TECHNIQUE

Double bassists with proper left-hand shape and positioning are typically more effective at playing the instrument and are less prone to injuries. Proper positioning involves curving the fingers and thumb, using only their pads while playing. The thumb

*__Note:__ It is important to clarify that the term "double-jointed" refers to increased joint flexibility and not the existence of an actual second joint.

supports this shape, as long as its joints are not collapsed. The hand should never fully grip the neck, as this creates unnecessary tension, meaning the palm's contact with the back of the neck should be limited. When shifting, the fingers and thumb should lightly brush the strings, neck, or fingerboard, respectively.[23] The goal for the left hand is to cultivate a relaxed yet efficient shape that allows for fluid movement while avoiding excessive strain.

WRIST AND FOREARM ALIGNMENT

The bones in the body are strong yet possess subtle elasticity, which helps prevent fractures in accidents. However, in their resting state, bones do not bend. This understanding is useful when imagining a straight alignment between the dorsal side of the hand, wrist, and forearm.

The structure of the forearm is relatively straight, making it a useful reference when optimizing the position and shape of the left arm and hand. By maintaining this natural alignment, a player can better leverage the arm's weight to press down the string, promoting improved arm positioning and making it easier to navigate the instrument. Prolonged wrist bending during play can restrict blood circulation to the fibrous tissues and place excessive strain on the joint, increasing the risk of injury. While occasional deviations from this optimal alignment are inevitable, they should be minimized to prevent long-term damage.

[23] Geoff Chambers, "Left Hand Technique for Double Bassists: How to Stop Pain and Discomfort and Improve Your Intonation," *Discover Double Bass*, September 13, 2016, https://discoverdoublebass.com/lesson/left-hand-thumb-technique-for-double-bassists-l58.

TRAINING THE FINGERS AND AVOIDING INJURY

When bassists experience fatigue or strain in their fingers, the idea of building the strength in their fingers could emerge. However, as previously mentioned, there are no muscles directly in the fingers. This common misconception may encourage a player to obtain this desired "finger strength" through performing more traditional, muscle-focused workouts instead of first analyzing their equipment. Basses that have a high string action are more likely to cause fatigue or strain in the hands. Lowering the string action can help alleviate this issue, but not all basses have bridge adjusters to accommodate this. Replacing the bridge is the other viable solution, but this can be an expensive and time-consuming process. As a result, some players turn to hand training equipment, such as finger extensor bands, to build their desired "finger strength."

Hand training devices are designed to have a fixed or adjustable resistance. Adjustable equipment may lead a player to prematurely increase the resistance in an attempt to accelerate their progress. However, this could easily result in an injury to the tendons or ligaments in the fingers. While muscle injuries heal relatively quickly, injuries to the tendons or ligaments are much more serious and can take weeks, months, or even a year to fully recover. This is due to these fibers receiving less blood flow than muscles. Tendons can be strengthened, but this process should be completed gradually and not be overly strenuous, as overtraining tendons could lead to negative outcomes.

Pressing down a string on a double bass involves both the height of the string action and the force, or spring tension, required to close the pitch. Spring tension is a term used

by woodwind players and refers to the amount of force it takes to press down the keys of their instrument. Woodwind players think about this idea as their repertoire highlights fast, agile movements. However, orchestral double bass repertoire is full of sustained notes and ostinato patterns as the instrument was originally designed to support the ensemble. This means that a bassist's finger spring tension should emphasize endurance over raw strength, which also helps one to avoid the deterioration of their finger dexterity. Prioritizing isometric, endurance-building routines promotes the development of functional strength. For example, holding a note for an extended period can be mimicked through maintaining a sustained squeeze of a stress ball. Performing multiple repetitions of this action will improve endurance while promoting a more useful and sustainable approach to training the fingers. Understanding the anatomical structure and capabilities of the hand helps bassists make better informed decisions while reducing the risk of injury.

ARMS AND SHOULDERS

The arms are divided into two sections, the upper arm and the forearm (lower arm), and are connected by the wrist, elbow, shoulder, and scapula (Figure 3). Together, the arm's structure enables a wide range of movements, from raising a glass of water to drawing the bow across the strings of a double bass.

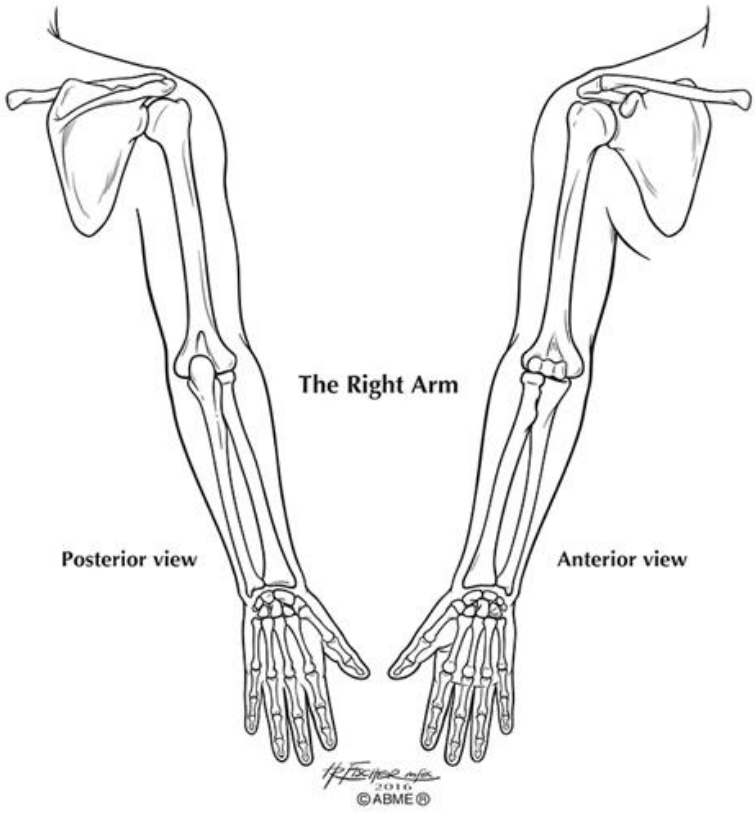

Figure 3: The Right Arm: Posterior and Anterior View. Drawing by Holly Fischer, 2016. Commissioned by ABME.

The skeletal structure of the arm consists of three long bones: the humerus in the upper arm, and the radius and ulna in the forearm. These bones are surrounded by large muscle groups that facilitate arm movement. The biceps and triceps encompass the humerus, enabling flexion and extension of the arm. The muscles around the radius and ulna, such as the brachioradialis, are responsible for elbow flexion, as well as pronation and supination of the forearm. The elbow is the connecting point between these sections of the arm and is known as a hinge and pivot joint, which is limited in direction to flexion, extension, and rotation.

The shoulder is a highly mobile and complex joint, consisting of the scapula, clavicle, and the humerus, as well as four distinct joints: the glenohumeral, acromioclavicular (AC), sternoclavicular (SC), and scapulothoracic joints. This intricate structure enables the shoulder to perform thirteen different types of movement, providing a wide range of motion that is essential for various activities, including playing musical instruments. The coordination between these bones and joints is crucial for effectively playing and navigating the double bass.

The scapula is a flat, triangular bone whose structure provides protection and stability to the intrinsic region of the shoulder and acts as a connecting point for the glenohumeral and acromioclavicular joints. The glenohumeral joint is known as a ball-and-socket joint, formed by the head of the humerus bone and the glenoid fossa of the scapula; it is responsible for seven types of movement.[24] The AC joint is a type of synovial joint located where the clavicle meets the acromion; it is responsible for three types of movement.[25] The SC joint is another type of synovial joint located where the clavicle meets the sternum. This joint is the only bone-to-bone connection of the arm to the body and is responsible for three types of movement.[26] Although the sternoclavicular joint is grouped into the complexity of the shoulder joint, it is important for double bassists to know its individual functions, as it holds a key role in performing at various contact points with the

[24] Physiopedia, "Glenohumeral Joint," *Physiopedia*, accessed August 28, 2024, https://www.physio-pedia.com/Glenohumeral_Joint.
[25] Physiopedia, "Acromioclavicular Joint," *Physiopedia*, accessed August 28, 2024, https://www.physio-pedia.com/Acromioclavicular_Joint.
[26] Physiopedia, "Sternoclavicular Joint," *Physiopedia*, accessed August 28, 2024, https://www.physio-pedia.com/Sternoclavicular_Joint.

bow and in the upper extremity of the instrument. Finally, the scapulothoracic joint is not a true joint because it does not have the same characteristics of a standard joint. It is instead better known as a physiological joint as it allows the scapula to move over the rib structure and is responsible for six types of movement.[27] It is important to mention that the types of movements each joint are capable of overlap with the others, amounting to a total of thirteen different movements.

The muscles surrounding the shoulder, including the deltoids, rotator cuff, labrum, trapezius, and levator scapulae, each play distinct roles in protecting, stabilizing, and enabling the shoulder's complex movements. Together, they work in harmony to support the joint, ensuring proper function and preventing injury during activity.

EXPLORING THE ARMS AND SHOULDERS

With the hands in a supinated position, it is possible to palpate the radius, located on the outside of the arm; closest to the thumb, and the ulna, located on the inside of the forearm; closer to the trunk. When the forearm rotates, the ulna remains relatively stationary while the radius rotates around it (Figure 4). This movement enables pronation and supination of the forearm, hand, and wrist.* If the movement of these bones proves difficult to discern, one can try loosely grasping the forearm with the opposite hand, then rotating it. This demonstrates the movement of the radius. A firm grip in the same position

[27] Physiopedia, "Scapulothoracic Joint," *Physiopedia*, accessed August 28, 2024, https://www.physiopedia.com/Scapulothoracic_Joint.

will restrict the movement of the radius and prevent rotation. These bones are surrounded by layers of muscles, but the superficial muscles, including the extensor digitorum communis and flexor pollicis longus,[28] can be found by applying pressure to the forearm.

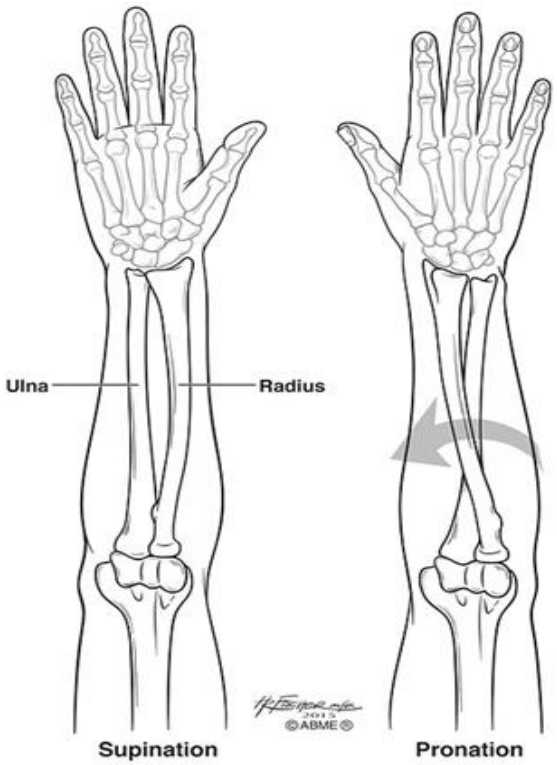

Figure 4: The Right Arm: Supination and Pronation View. Drawing by Holly Fischer, 2015. Commissioned by ABME.

***Note:** "Wrist or hand rotation" is not accurate or possible as pronation and supination movements originate at the radioulnar joints of the forearm.[29]

[28] Physiopedia, "Flexor Pollicis Longus," *Physiopedia*, accessed December 3, 2024, https://www.physio-pedia.com/Flexor_Pollicis_Longus; Physiopedia, "Extensor Digitorum Communis," *Physiopedia*, accessed December 3, 2024, https://www.physio-pedia.com/Extensor_Digitorum_Communis.
[29] KenHub, "Elbow and Forearm: Pronation and Supination," *KenHub*, accessed December 28, 2024, https://www.kenhub.com/en/library/anatomy/pronation-and-supination.

The elbow is often known as the “bump” at the outer side of the arm. This “bump” is part of the ulna bone and represents the outer aspect of the elbow joint. Surrounding this joint are ligaments and tendons that contribute to its structural stability. These connective tissues may be difficult to palpate due to the surrounding muscles, so it is more constructive to focus on the overall structure of the elbow while knowing that it is supported by many layers of fibrous tissue. Depending on the level of one’s biceps development, the insertion of the biceps tendon may also be palpable.

The humerus is longer than many have mapped it to be. Palpating the full length of the humerus, from the elbow to the shoulder, allows one to observe its true length. The muscles in this region are substantial and easily palpated. Flexing the arm will reveal the biceps, while extending will expose the triceps. Many novice weightlifters focus primarily on developing the biceps to increase arm size. However, the biceps only account for approximately one-third of the upper arm’s muscle mass. Bassists seeking to increase their arm’s weight, which will be explored later, will find it more effective to concentrate on developing the triceps, which makes up two-thirds of the upper arm's muscle volume.

As mentioned, the shoulder is capable of thirteen distinct types of movement. Rather than listing each one, it is recommended to place one hand on the opposite shoulder and slowly move the arm in all directions. Doing so will provide a clearer sense of the shoulder’s full range of motion. The deltoid and trapezius muscles surrounding the shoulder are the easiest to locate due to their size. However, the levator scapulae can also

be easily found by palpating from the posterior base of the skull to the scapulae.* The sternoclavicular joints can be located by first finding the clavicle and moving the hand towards the neck. With the hand in place, extending the arm away from the body and reaching further (as if trying to grasp an object just out of reach) is made possible by this joint and is an essential movement for bassists.

HOW DOES THIS HELP BASSISTS?

Without the two bones in the forearm, rotating the arm would be impossible. This rotation is essential for movements such as vibrato and for holding the bow in the right hand while playing pizzicato. Being aware of these small movements can serve as useful reference points when teaching, as well as reminders for adjusting the size of your vibrato or transitioning quickly between arco and pizzicato. Furthermore, the muscles in the forearm are responsible for preventing the bow tip from dropping, making them essential in maintaining proper control.

*__Note:__ The levator scapulae are often responsible for the pinch or stinging pain that many bassists feel in their neck or shoulder at the end of a rehearsal. It is caused by over engaging this muscle while playing.[30]

[30] Forest Greenough, "Shoulder Health for the Bassist," (presentation, ISB: Center Stage Event, online, November 16, 2024).

The elbow's joints grant it the ability to move in three directions, but only the flexion and extension are utilized when attempting to make smooth bow changes. When drawing the bow across the strings, focusing on leading with the elbow helps to provide bow control while also allowing the hand and wrist to operate more freely. This knowledge can be helpful when diagnosing issues related to the arm's movements, as any activity occurring outside of the elbow's capabilities is happening in another part of the body.

The term "arm weight" is commonly used by double bassists to describe the transfer of the full weight of the arm through the bow and into the strings. Using the arm's natural weight without pressing or forcing the bow into the strings grants the player the possibility of achieving a fuller sound because they can completely access the instrument's capabilities. One's arm weight is determined by the size and mass of their arm's structure and is a difficult technique to master, as it requires full control and tension-free usage of the arm. Larger arm muscles can make it easier to access the instrument's full sound,* so bassists with smaller frames may benefit from developing these muscles. Many workout routines are available that target the arms, but a good starting point is to focus on the triceps. If one is inexperienced with strength training, consider consulting a personal trainer to develop a well-suited routine.

***Note**: Equipment can also play a role in achieving better sound, but it is sensible to first visit one's playing technique. If one has concluded that they are outplaying the capabilities of their equipment, then an upgrade may be necessary to reach higher levels of skill.

Human mobility would be greatly diminished without the shoulders because they allow the arms to move in a multitude of directions. Without their flexibility and strength, basic activities, such as lifting or throwing objects, would be severely limited. For double bassists, accessing their full range of motion is crucial for performing at a high level. Protecting shoulder mobility and prioritizing functional strength is essential. Many shoulder workouts that can be found online focus on training extrinsic muscles to stabilize and build up the size of the shoulder. However, they fail to target the intrinsic muscles, which, when trained, can offer more functional strength that is helpful for a double bassist.

Dr. Forest Greenough, associate professor of double bass at Colorado State University, suffered a severe shoulder injury while kayaking in 2013, resulting in a 360-degree tear in his labrum. His rehabilitation involved working with a physical therapist to develop a customized recovery plan that targeted his intrinsic shoulder muscles. Low-resistance weights and exercise bands were useful tools in his recovery, and exercises such as lying external rotations, horizontal abductions, and high-to-low rows helped restore his shoulder function.[31] As a result, Dr. Greenough is now able to perform with no shoulder discomfort and is an advocate for being proactive versus reactive to injuries.

Though overlooked, the sternoclavicular joint plays a crucial role for double bassists, especially in the right arm. It helps facilitate the movement of the bow across the strings, particularly during changes from up-bow to down-bow. In the left arm, this joint

[31] Forest Greenough, "Shoulder Maintenance for the Bassist," (paper presentation, ISB: Center Stage Event, online, November 16, 2024).

grants access to the very end of the fingerboard and beyond. While these actions are used by almost every bassist, most are unaware of the SC joint and thus only unconsciously utilizing it. Bassists should be informed of this joint and its role in carrying out the complex movements involved with playing the instrument because it can help identify and solve playing issues involving the arm-to-torso connection.

HEAD, NECK, AND SPINE

The head houses the skull and brain and serves as the central command system for the body by producing and sending out signals that control bodily functions. The neck supports the head and contains the cervical spine. This portion of the spine contains the brain stem, which connects the brain to the spinal cord, and is the most important, connecting component of the central nervous system.

At birth, the skull is separated into pieces to accommodate birth and brain growth.[32] As a person ages, some of these eight cranial bones begin to fuse forming sutures, which do not fully develop until the age range of 30 to 40.[33] The face is structured by fourteen facial bones, including the mandible (jaw),[34] and can make expressions by using its forty-

[32] Mount Sinai, "Cranial Sutures: Fontanelles; Sutures – Cranial," *Mount Sinai*, last reviewed January 24, 2023, https://www.mountsinai.org/health-library/special-topic/cranial-sutures.
[33] Stanford Medicine, "Anatomy of the Newborn Skull," *Stanford Medicine: Children's Health*, Accessed, August 30, 2024, https://www.stanfordchildrens.org/en/topic/default?id=anatomy-of-the-newborn-skull-90-P01840.
[34] Kenhub, "Bones of the Skull," *KenHub*, accessed August 30, 2024, https://www.kenhub.com/en/study/anatomy-skull-bones.

three mimetic muscles.[35] Along with the cervical portion of the spine, the neck contains over twenty muscles that control the movements made by the head.[36]

The cervical spine consists of seven vertebrae. The connection between the skull and the spine is formed by the atlanto-occipital (AO) joint, which consists of the C1 vertebra, also known as the atlas bone, and the occipital bone of the skull (Figure 5).[37] The atlas bone is named after the Greek mythology deity Atlas, who was condemned by Zeus to hold up the heavens.[38]

Figure 5: Lateral View of A-O and Atlas-Axis Joints. Drawing by Holly Fischer, 2016. Commissioned by ABME.

[35] Physiopedia, "Facial Muscles – Upper Group," *Physiopedia*, accessed August 30, 2024, https://www.physio-pedia.com/Facial_Muscles_-_Upper_Group.
[36] Kenhub, "Facial Muscles – Lower Group," Physiopedia, accessed August 30, 2024, https://www.physio-pedia.com/Facial_Muscles_-_Lower_Group; Stanford Medicine, "Anatomy of Newborn Skull," 2024; Cleveland Clinic, "Neck Muscles," Cleveland Clinic, last reviewed August 21, 2021, https://my.clevelandclinic.org/health/body/21670-neck-muscles.
[37] Physiopedia, "Atlanto-Occipital Joint," *Physiopedia*, accessed August 21, 2024, https://www.physio-pedia.com/Atlanto-occipital_joint.
[38] Tayfun Hakan, "A Unique Vertebra that Takes Its Name from a Hemitheos in Greek Mythology, Atlas," *World Spinal Column Journal* 1, no. 3 (2010): 212-14, https://www.academia.edu/89770419/.

The spine is divided into four sections: cervical, thoracic, lumbar, and sacral (figure 6).[39] The number of vertebrae in each section varies, with each vertebra increasing in size as it progresses towards the pelvis. Each vertebra has an intervertebral disc made of cartilage that structurally supports the spine and acts as shock absorbers, which allow the spine to twist, flex, and bend. Additionally, each vertebra has a set of processes, where muscles attach and a vertebral foramen which the spinal cord passes through.

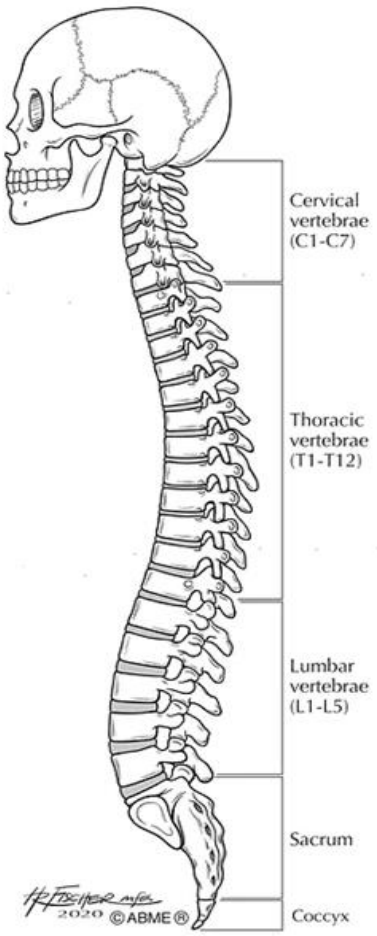

Figure 6: Lateral Vertebral Column and Skull. Drawing by Holly Fischer, 2020. Commissioned by ABME.

[39] Cleveland Clinic, "Spine Structure and Function," *Cleveland Clinic*, accessed August 28, 2024, https://my.clevelandclinic.org/health/body/10040-spine-structure-and-function.

EXPLORING THE HEAD, NECK, AND SPINE

The head is a large and heavy structure, comparable in weight to a bowling ball, averaging 11 to 12 pounds. It is challenging to measure the exact weight of the head without medical equipment. However, a better understanding of its size can be gained by palpating the cranial and facial bones, temporomandibular joints, and the surrounding muscles.

The AO joint is located directly at the center of the neck and the skull. To locate this joint, one should stand or sit in an upright position and place their extended index fingers directly behind the earlobes, ensuring that the fingers are aligned with the dorsal part of the hands. By moving the head slowly in all directions, one can sense how the head balances on this incredibly significant joint.

A notable feature in the neck is the laryngeal prominence, commonly referred to as the Adam's apple. This protrusion of cartilage, particularly prominent in men, serves to protect the larynx. Behind it lies the trachea and esophagus, also encased in cartilage. When palpated, the trachea can be identified as having ridges. These ridges are rings of cartilage that protect and support this structure. The esophagus is not palpable, but one can experience its function by placing a hand on their neck while swallowing. The neck can be sensitive for some, so it is advised to be gentle while palpating this area.

Palpating the cervical vertebrae is easier than the thoracic and lumbar vertebrae, as they are more exposed. By exploring this skeletal structure, one can observe how each vertebra is stacked on top of the other. To better understand the functional movement of

the spine, one can try touching their toes from a standing position, demonstrating its bending capabilities. From a supine position, one can rotate their bent knees to either side while keeping the shoulders flat on the floor to demonstrate its rotational ability. To visualize the size difference between the cervical and thoracic vertebrae, one can use their hands: connecting the thumb and index finger at their tips represents the size of the cervical vertebrae, while connecting both index fingers and thumbs at their tips represents the size of the thoracic vertebrae.

HOW DOES THIS HELP BASSISTS?

When playing in the higher registers of the bass, it is common to see a player move their neck forward and curve it downwards. This unergonomic and unbalanced position often occurs due to the player trying to see where they are placing their fingers. Curving from the upper part of the spine is a natural function, such as when one touches their toes, but this extreme positioning demonstrates a form of Downward Pull, as the head's weight is creating tension and strain in the musculature of the neck. The amount of burden on the neck muscles directly relates to the angle at which the head leans. A great and transferable example of this is the more recently named phenomenon “tech neck,” or forward head posture.

Tech neck, or the poor posture associated with using electronic handheld devices, appeared in society due to the rising popularity of portable technology, such as smartphones. It is characterized as a condition of pain or discomfort that is found typically

in the muscles of the neck, shoulders, or upper back, and is caused by individuals using their phone in a position that causes the neck to bend forward. The amount of weight placed on the muscles depends on how far the head is tilted out of alignment. Keeping the head tilted between 0 to 10 degrees places minimal stress on the muscles, while tilting the head forward to 60 degrees can place up to 60 pounds of weight on the muscles (Figure 7).[40] This Downward Pull causes misalignment in the body and is directly relatable to how bassists drastically curve their neck while in the higher registers of the instrument. Spinal alignment has been iterated as being important, but the upper spine is allowed to bend within a reasonable parameter when needed to. It is encouraged to avoid bending the spine outside of these boundaries as this increases the risk of pain or discomfort.

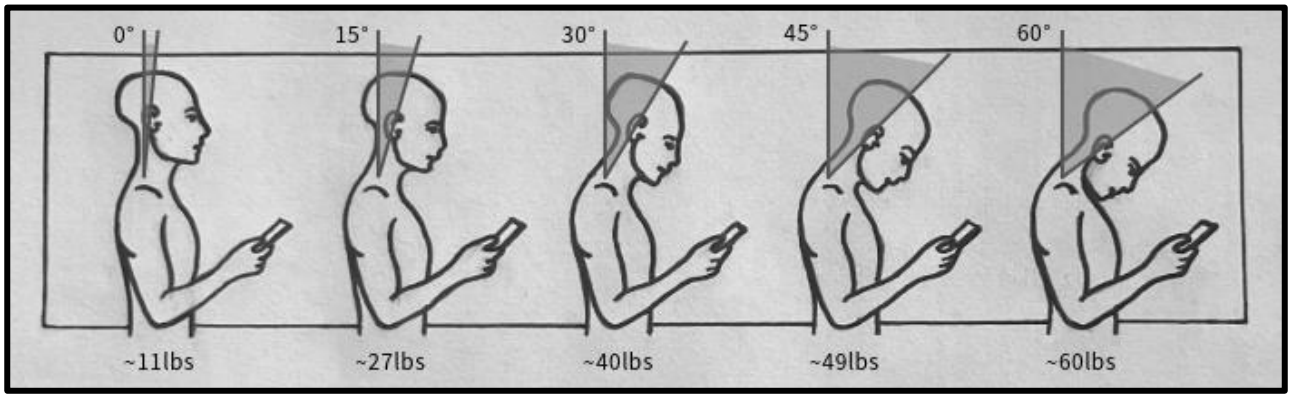

Figure 7: Tech Neck. Drawing by Kurt Melendy, 2024.

[40] Physiopedia, "Forward Head Posture," *Physiopedia*, accessed August 28, 2024, https://www.physiopedia.com/Forward_Head_Posture; Ross Hauser, "Forward Head Posture Symptoms and Complications," *Caring Medical Florida: Hauser Neck Center*, last modified July 13, 2023, https://caringmedical.com/prolotherapy-news/forward-head-posture/; Jared A. Crasto, "Is Your Cell Phone Wrecking Your Neck?" *The Christ Hospital Health Network* (blog), December 1, 2022, https://www.thechristhospital.com/healthspirations/how-tech-gadgets-are-hurting-your-neck-and-back.

When playing a piece in the upper extremities of the double bass, it's helpful to bend from the hip joints rather than rounding the back, as this can put unwanted pressure on the spine.* This movement helps to engage the "sitz bones" and allows the player to adopt a more advantageous stance. The sitz bones will be explored later in the document.

Sitting on a stool while playing can make it easier to navigate around the instrument, but sitting with poor spinal alignement can interfere with a bassist's ability to perform at their full capacity. The spine should be vertically aligned but available for movement, even while sitting, to allow the body's weight to be more evenly distributed. However, slouching is commonly seen among seated players. One form of slouching involves curving of the thoracic and lumbar spine. This reduces a player's access to their body's full range of motion, which is detrimental given the instrument's size. Another form of slouching occurs with stools that have backrests. Leaning against the backrest encourages the

***Note:** When practicing for extended periods, especially in the extremities of the bass, it is essential to take breaks to prevent muscle tension buildup, especially if one has a known tendency to engage in Downward Pull. Neglecting breaks works against the player, as one's endurance never has the chance to replenish, increasing the probability of injury from poor positioning. For bassists who play sitting, standing up allows the blood to flow into areas, such as the nerves, that may have once been compromised by compression.

Doing so also helps prevent the development of serious health risks and allows the mind to refresh its focus, leading to increased productivity upon return.

player to sit on the back of their sitz bones. This shifts the upper body away from the instrument, leading to many problems such as the overuse of the sternoclavicular joint through extended periods of reaching and Downward Pull in the neck.

Traditionally, many bassists sit with their left foot on the rung of the stool to help support the instrument and position it more advantageously. However, this positioning tilts the pelvis and creates pressure on the lower spine. Prolonged use of this position can lead to pinched nerves and cause pain. A useful discovery for preventing this lower back pain is the implementation of a yoga block. By placing a yoga block under the left foot, bassists can achieve a similar position to having the left foot placed on the rung of the stool while mostly eliminating the associated pelvic tilt, which significantly reduces the amount of pressure placed on the lower back.

Optimally using the body's features can greatly benefit a bassist. The head, neck, and spine play essential roles in the body and in movement and must be properly aligned for more safe and ergonomic playing. This can only be achieved through increased awareness and understanding of how these structures function together. With the right knowledge and application of these ideas, bassists can improve their technique, prevent injury, and enhance their physical well-being and career longevity.

TORSO (BACK AND ABDOMEN)

The torso is the central part of the body and is divided into three main sections: the chest, abdomen, and back. It houses most of the body's organs and is supported and protected by large muscle groups and the ribs*. Many vital structures exist and function in this area. Therefore, only topic-related areas will be referenced in this section.

The chest contains the cardiovascular system, which consists of the heart and lungs. Its primary function is to intake oxygen, enrich the blood, and pump it throughout the body. Twelve pairs of ribs connect to the spine and are surrounded by muscles that work together to shield the heart and lungs from damage. These intercostal muscles also contribute to breathing, but approximately 70% of this work is completed by the diaphragm, a thin, fibrous muscle located just below the lungs.[41]

The abdomen houses most of the organs involved in digestion. The nearest bones to this system are the spine and pelvis. No bones are found in the anterior abdomen; meaning that these organs are protected by multiple layers of strong muscles, including the abdominis and obliques, which run vertically from the pelvis (Figure 8).

*__Note__: Conable suggests that the ribs should not be referred to as the "ribcage," as the lungs are not separated from the body. The ribs would also make for a rather lacking cage, considering the structure moves quite a bit and is not closed off at the bottom.

[41] Thais Borges Lessa, Dilayla Kelly de Abreu, Bruno Machado Bertassoli, et al., "Diaphragm: A Vital Respiratory Muscle in Mammals," *Annals of Anatomy - Anatomischer Anzeiger* 205 (2016): 122-27, https://doi.org/10.1016/j.aanat.2016.03.008.

The back of the body houses the spine, along with multiple layers of muscles that provide essential support and protection for its deeper internal structures. Key muscles in this area, including the latissimus dorsi, trapezius, and rhomboids, play vital roles in stabilizing the upper body while also assisting in mobility. Together, these muscles are vital in ensuring that the body can move efficiently and safely.

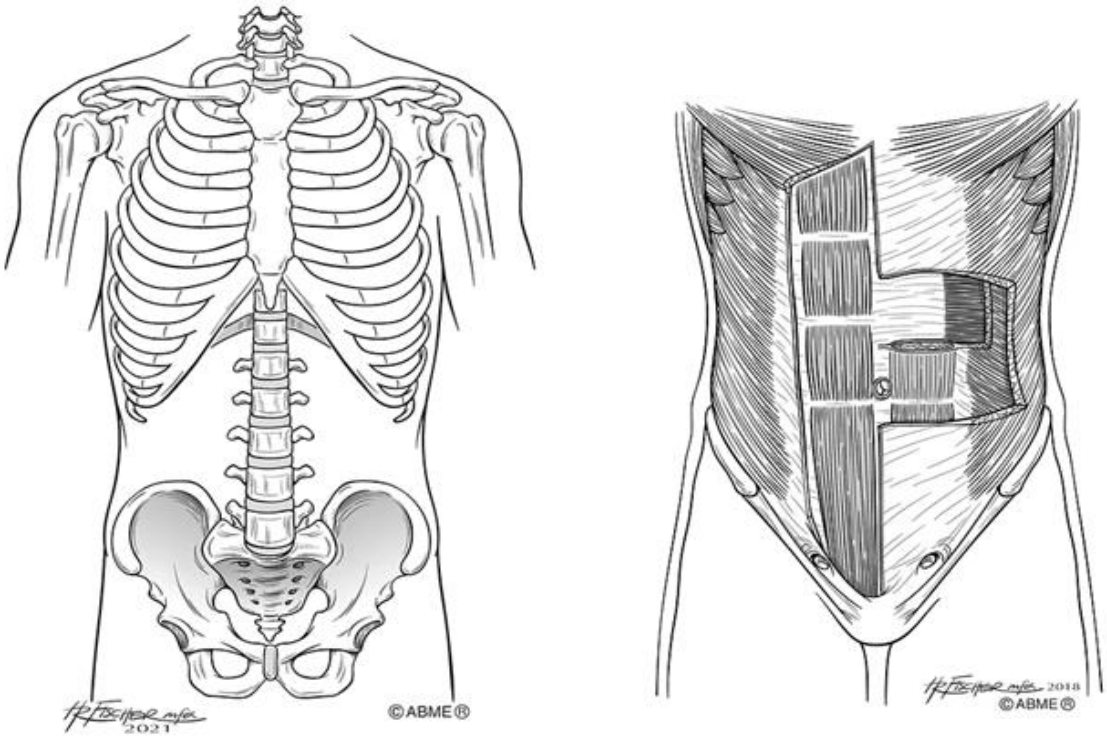

Figure 8: Torso (Anterior View), 2021 and Anterior View of the Muscles of the Trunk, 2018. Drawings by Holly Fischer. Commissioned by ABME.

EXPLORING THE TORSO

Palpate the ribs by running the fingers along the sides of the torso. Notice how the lowest pairs of ribs extend toward the top of the abdomen. If possible, reach around to the back and feel how the ribs are connected to the spine, then slowly follow their curved

structure back to the front of the body. If comfortable, apply pressure between each set of ribs to notice some of the intercostal muscles. Take a moment to find the sternum, which is a long flat bone located in the center of the chest. The inferior part of this bone acts as a connecting point for the diaphragm. Although the diaphragm itself cannot be palpated, knowing that acts as a vacuum, pulling air into the lungs and flattening in shape, and then returning to a resting position on exhales (resembling a dome or an inverted bowl), can indirectly bring awareness to how this structure functions during respiration (Figure 9).[42] The lungs expand in multiple directions, not only along the sagittal plane. To notice this expansion, a scarf can be wrapped around the upper back, and while a breath* is taken, it is possible to notice the movement of the lungs along the frontal plane. For further exploration, the scarf can also be positioned at the middle and bottom parts of the ribs.

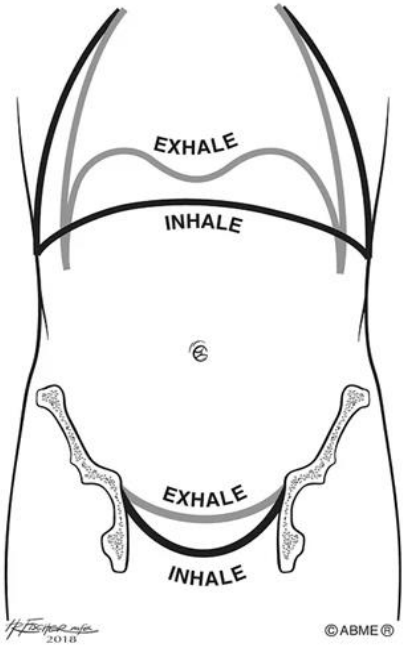

Figure 9: Diaphragm Inhale and Exhale, 2018. Drawing by Holly Fischer. Commissioned by ABME.

[42] Lessa, "Diaphragm: Respiratory Muscle," 2016.

The abdomen plays a pivotal role in large-scale movements and is located between the bottom of the ribs and the top of the pelvis. To locate the muscles in the abdomen, one should place both hands on the abdomen and flex. Flexing allows the rectus abdominis (the "six-pack" muscles) to be felt. While all individuals have these muscles, their definition is influenced by the amount of adipose tissue covering them. The obliques lie laterally to the rectus abdominis and can also be palpated with the same approach. Forcibly expelling air from the lungs can also draw awareness to the abdomen.

The back contains many muscles that are essential for musicians. The trapezius muscles, which originate from the cervical and thoracic vertebrae and insert at the acromion process of the scapula, are in the form of an inverted triangle and can be felt in the upper portion of the back. The upper portion of these muscles can be located by placing the hands near the scapulas. If discomfort is felt following prolonged rehearsals or performances, and the levator scapulae is not the culprit, then the trapezius muscles are a second-best guess as they share some of movements made by the levator scapulae. The rhomboids, situated beneath the trapezius, can be palpated with the aid of a tennis ball. By positioning the ball between the upper back and a wall and gently massaging the surrounding area, the muscles will be stimulated. The latissimus dorsi originates from the

*__Note:__ It is commonly misconceived that air enters the stomach during respiration. This is not true and is in fact the abdomen expanding in response to diaphragm functioning during respiration.

Figure 10: Latissimus Dorsi (with Origins and Insertions), 2015. Drawing by Holly Fischer. Commissioned by ABME.

thoracic and lumbar vertebrae and inserts at the humerus, providing considerable support for upper body movements. These muscles are more easily located while referencing anatomical images (Figure 10). Once found, they can be palpated with a tennis ball in a similar fashion to the rhomboids.

HOW DOES THIS HELP BASSISTS?

Breathing can help mitigate anxiety when supplemented with breathing techniques, but the lungs cannot function at full capacity when compromised. The breath is a powerful resource that connects to the parasympathetic nervous system, which helps encourage repose. Deepening and lengthening the breath requires accessing the lung's full capacity

and has been shown to promote calmness in the body. Specialized breathing techniques such as *ujjayi*, *bhramari*, and box breathing are just a few helpful techniques and will be explored later.

The abdomen is a central hub for many major muscle groups, and it plays a key role in protecting the organs. These muscles hold significant strength that can be directly applied to playing the double bass. When a musician rotates their body, the abdominal muscles are activated. By tapping into the potential held by the muscles in this area of the body, a stronger, more resonant sound can be achieved.

The muscles in the back play a crucial role in enabling a bassist to more efficiently use the bow with less effort. By initiating a rotational motion from the obliques and latissimus dorsi, a rich, quality sound becomes achievable. This movement needs to be fluid and not over stimulated, as the muscles could become tense. If this does occur, pausing to decrease the chance of forming a bad habit and releasing the built-up tension is encouraged, as sustained tension increases the risk of injury.

A fundamental understanding of the torso's anatomy can significantly enhance a bassist's approach to playing, sound production, and overall efficiency. Additionally, learning about its capabilities can allow a player to consciously refine their technique, which can lead to a smoother and more controlled sound. Exploring the torso is more easily accomplished through palpation that is reinforced by visual aids, and basic tools, such as a tennis ball, can help in identifying deeper, key muscle groups and areas of

tension. If this knowledge is implemented, bassists can unlock a greater potential in their playing and musicality through the better use of their body.

PELVIS

The pelvis acts as a midline connecting point for the spine, at the sacroiliac joint, and the legs, at the hip joints.[43] It consists of three bones that fuse together between the age of 11 and 17 and varies widely between individuals based on factors such as genetics, age, gender, and overall health.[44] For example, a female pelvis tends to be wider and shorter to accommodate childbirth, while a male pelvis is narrower and denser to support larger frames.[45] Regardless of its shape, the pelvis has numerous muscles attaching to it, making it a pivotal structure for many bodily movements.

The ischium, located at the bottom of the pelvis, is curved, facilitating mobility among other things. These bones are commonly referred to as the "sitz bones" as they are the primary points of contact when sitting. However, they are often overlooked despite their important role in distributing the body's weight. When sitting upright on a stool, the spine is aligned, allowing for proper weight distribution while encouraging the body to be balanced. This natural balance can, however, be disrupted by slouching and

[43] KenHub, "Bony Pelvis," *KenHub*, accessed October 3, 2024, https://www.kenhub.com/en/study/bones-pelvis-femur.
[44] TeachMeAnatomy, "The Pelvic Girdle," *TeachMeAnatomy*, accessed October 3, 2024, https://teachmeanatomy.info/pelvis/bones/pelvic-girdle/; Melanie Beasley, "Age of Pelvic Bone Fusion," *Center for Academic Research & Training in Anthropology*, accessed October 12, 2024, https://carta.anthropogeny.org/moca/topics/age-pelvic-bone-fusion.
[45] Marco Siccardi, et al., "Anatomy, Abdomen and Pelvis, Pelvis Inlet," *National Library of Medicine (NIH)*, last modified March 5, 2023, https://www.ncbi.nlm.nih.gov/books/NBK519068/.

hyperextending. When this happens, mindful awareness and Conscious Constructive Control can be utilized to correct one's poise.

EXPLORING THE PELVIS

The hip joint, distinct from the "hip bones" (or the bony prominences of the pelvis), can be located by placing the thumbs on the top of these prominences and extending the fingers downward. This will bring the tips of the fingers near the hip joint. Marching in place is a great way for one to find the exact location of their joint, as it can vary between individuals, and assess their joint's range of motion. This movement, along with others, is made possible through the coordinated efforts of the muscles connected to the pelvis.

The sitz bones can be located by sitting on the hands, one at a time. Prolonged sitting on one or both hands should be avoided, as the sitz bones support approximately 60% of the body's weight while sitting.[46] The size and curve of these bones can be explored by sitting on the edge of a hard chair and rocking forwards, backwards, and side to side.

The sacrum connects to the pelvis and is located just above the gluteal region. It is smoother and flatter compared to other parts of the spine, as it lacks the bony processes found in the vertebrae. The coccyx, or tailbone, is situated at the bottom of the sacrum. While it can be palpated, it should be done in private as it requires exploring the superior

[46] Helen Zidon, "Differences Between the Male and Female Bony Pelvises | Anatomy Slices," *Complete Anatomy* (blog), April 15, 2019, https://3d4medical.com/blog/differences-between-the-male-and-female-bony-pelvises-anatomy-slices.

part of the intergluteal cleft. However, if in public, a more discreet method to locate the coccyx is to slouch backward in a chair with a backrest. In this position, the coccyx will be the firm structure that is not generally felt when sitting upright.

HOW DOES THIS HELP BASSISTS?

The pelvis plays a crucial role in maintaining the body's alignment. Understanding that the hip joint is the vertical halfway point in the body helps determine where a bassist should lean from, while keeping the spine aligned, to prevent back pain. While individual variations in pelvic structure exist, the contact point between the curved sitz bones and the stool influences the amount of lean required when playing, especially in the instrument's extremities. Leaning too much or too little while playing can lead to discomfort, so it is important to bring awareness to this unique structure to enhance performance.

The sitz bones help distribute the body's weight.[47] Due to their rounded structure, multiple points of contact can occur when sitting on a hard surface, such as a stool. To clarify this concept, a diagram was created that divides the sitz bones into three areas of contact: the front, middle, and back (Figure 11). The middle section is the most ideal placement for the sitz bones as it encourages spinal alignment and balance. Sitting in the back section may cause the spine to collapse, encouraging slouching, and could irritate the coccyx in prolonged situations. In contrast, sitting in the front section can place the

[47] TeachMeAnatomy, "The Pelvic Girdle," 2024; Physiopedia, "Ischium," *Physiopedia*, accessed October 3, 2024, https://www.physio-pedia.com/Ischium.

lumbar spine into an overextended or over-engaged position, which can quickly lead to lower back discomfort. When thinking of the pelvis, no fixed point should be declared because mobility and awareness are necessary to navigate the instrument's extremities.

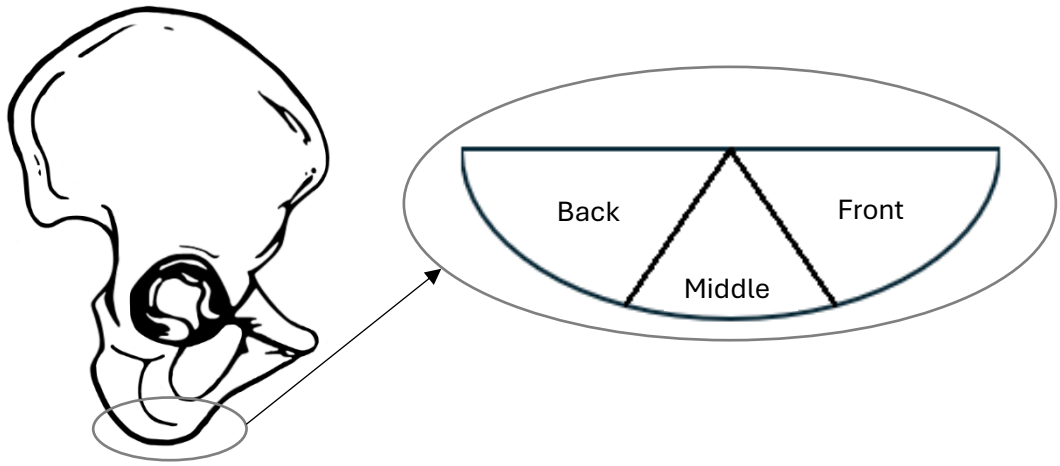

Figure 11: A lateral view drawing of the pelvis. The circled area highlights the sitz bones, showing their division into three sections: back, middle, and front. Drawing by Kurt Melendy, 2025.

Anecdotal evidence from personal observations of college and professional level players has shown that it is common for bassists to sit on the majority—or even the entirety—of the stool. Combined with the weight of the instrument pressing against the torso, this often pushes the contact point of the sitz bones into the back section, as shown in Figure 11. To counteract this, many bassists are encouraged to sit toward the front half of their stool or modify the stool to increase comfort. However, adaptations to one's physical position may be used to stimulate better contact of the sitz bones in their middle section and spinal alignment. One such adaptation involves lowering the front two legs of the stool relative to the back two. This adjustment alters the body's balance, promoting a more ergonomic and comfortable approach to playing. However, while this modification

has the potential to help certain individuals, it may also inadvertently encourage sitting in the back section of the pelvis depending on how much weight is directed into the torso.*

Having basic knowledge and awareness of the pelvis allows a bassist to make more informed decisions regarding their playing position and setup. This crucial skeletal structure is often overlooked by many players, yet it holds significant potential to improve both comfort and performance when properly engaged. Understanding its role can lead to better movement, reduced strain, and enhanced overall playing technique.

SUMMARY OF HOW BODY MAPPING HELPS BASSISTS

Although all the previously mentioned body parts were divided into sections, they are all linked together and work in unison. The fingers cannot move without the muscles in the forearm and the forearm cannot bend without the joint at the elbow. Viewing the body as a fluid, supported structure can help reduce the amount of tension that often tends to build up during performances. For bassists, this is incredibly important considering the size of the instrument. Musicians position themselves in specific ways to get the best sound and some more extended positions place the body into unergonomic positions that can cause discomfort or pain when not approached from a mechanically advantageous

***Note:** The amount of weight directed into the torso can be determined by the length of the bass's endpin, which affects the height of the instrument, and how far way the bass is placed from the player. Together these variables decide the angle that the instrument is played at and determine its distribution of weight into the body.

mindset. Double bassists aim to perform on their instrument at its full capacity, regardless of if their body engagement comes from a conscious or unconscious existence. Without this engagement, a player's sound may be heard as incomplete or lacking in quality.

An instrument must organically move with a musician as they play. But the opposite is also true, as the musician must organically move with the instrument when played. Both are useful phrases for a musician but invoke different ideas. The first iteration suggests that the instrument should respond to the musician's physical movements, enabling the production of a quality sound without interference. By consciously and consistently practicing this idea, a player can enhance their performance by making the instrument more responsive to their movements. The second statement proposes that a musician's physicality should complement their double bass. This consideration is crucial and better utilized when shopping for an instrument, as it emphasizes aligning the player's physical traits with the instrument's characteristics, while also prioritizing comfort and playability.*

***Note:** This statement could, for example, help indicate if a 3/4 size instrument is better suited for an individual instead of a 7/8 size by recognizing one's current physical traits, such as height, arm span, and hand size. Many factors and preferences play into the search for a suitable instrument, but as mentioned, comfort and playability should be prioritized.

Body Mapping is a physically and mentally engaging practice that connects the mind and body by fostering deeper awareness of movement and alignment. This, in turn, promotes comfort and efficiency by enabling well-informed decision-making and encouraging healthier, more sustainable playing habits. By integrating Body Mapping into their practice routines, double bassists can enhance both their physical well-being and musical performance, making it a valuable tool that should be more widely utilized to improve long-term comfort and prevent injury.

PHYSIOLOGICAL ASPECTS:

The Alexander Technique helps establish and maintain a more optimal position when playing, while Body Mapping assists with understanding the structure and movements of the body. These two practices must be explored regularly as it is possible to slip back into previous habits, such as a collapsing spine or playing while tense. Consciously incorporating these practices can enhance one's musicianship, and further improvement can be achieved by physically training the body.

When using the word "training," one of the first accompanying words that comes to mind is "athlete." For thousands of years, humans have pursued athletic endeavors to showcase their strength and skill, with only the most talented rising to the professional level. Performing at this high level requires discipline and experience that is typically gained through a regimented training program. These programs are detail oriented because athletes want to maximize their efforts and time, with the aim of outperforming others.

Musicians should emulate the structured training used by athletes for three reasons:

1) It maximizes the efficiency of practice time.
2) It decreases ambiguity on what to work on when starting a practice session.
3) Musicians are athletes.

In a meeting with Professor James Brody, the Director of the Musicians' Wellness Program at the University of Colorado Boulder, he told a story about a sports coach attending an operatic performance for the first time:

> *A sports coach is invited by a friend to attend an opera. He has never attended one and is not particularly interested but politely accepts the invitation. After sitting through the first act, the coach comments on the wonderful performance and gets ready to leave. The friend replies by saying that the second act is even more exciting. Not expecting a second act, the coach courteously smiles and takes his seat again. By the beginning of the third act, the coach sinks into his seat filled with boredom and decides to watch the pit orchestra. He enjoys the music but then realizes just how long the musicians have been playing, with only brief breaks in between the acts. At the conclusion of the performance, the coach expresses how impressed he is with the musicians' endurance, having performed for over three hours, and how his athletes do not even train that consistently at a practice. The friend reciprocates his feelings and is happy that he found something enjoyable out of the performance. The sports coach recognized and appreciated the musicians' athleticism, especially when finding out that they would play in two more performances that same weekend.*[48]

[48] James Brody, "Sports Coach Attending an Opera," (lecture, Music Wellness Class, University of Colorado Boulder, Boulder, CO, February 2024).

The word origin of “athlete” can be dated back to the early 15th century from different languages including Latin, (*athleta*, “a wrestler, athlete, combatant in public games"), and Greek, (*athlētēs,* "prizefighter, contestant in the games”).[49] As time progressed, a semantic shift, in the form of broadening, occurred, expanding on the definition’s meaning. Looking at seven different dictionary sources, the original definition for the word remains intact, but it is not clear whether the word should be used:

1.) Unanimously amongst the population, regardless of skill level,

2.) for those who compete competitively,

3.) whether a prize is involved,

4.) whether all physical traits, such as strength, agility, or stamina, need to be considered.[50]

Additionally, some sports measure victories in less traditional and less physically demanding ways compared to long-established sports like wrestling. However, those who engage in these activities are still recognized as athletes, even at the Olympics. Examples

[49] Online Etymology Dictionary, s.v. "athlete," accessed October 12, 2024, https://www.etymonline.com/word/athlete.

[50] Merriam-Webster, s.v. "athlete," accessed October 14, 2024, https://www.merriam-webster.com/dictionary/athlete; Dictionary.com, s.v. "athlete," accessed October 14, 2024, https://www.dictionary.com/browse/athlete; Collins Dictionary, s.v. "athlete," accessed October 14, 2024, https://www.collinsdictionary.com/us/dictionary/english/athlete; Oxford Reference, s.v. "athlete," accessed October 14, 2024, https://www.oxfordreference.com/display/10.1093/oi/authority.20110803095431536; Oxford’s Learner’s Dictionary, s.v. “athlete.” Accessed October 14, 2024. https://www.oxfordlearnersdictionaries.com/us/definition/english/athlete; Vocabulary.com, s.v. "athlete," accessed October 14, 2024, https://www.vocabulary.com/dictionary/athlete; Britannica Dictionary, s.v. "athlete," accessed October 14, 2024, https://www.britannica.com/dictionary/athlete.

of these sports include shooting, archery, golf, and bowling.[51] Each one requires a lesser amount of physical exertion, but a high level of precision, accuracy, and technique.

It is clear that the definition of an athlete has expanded beyond its traditional meaning, allowing room for musicians to fit into this category. The nature of playing an instrument requires one to have a high level of skill in physical traits including agility and stamina that are gained through training and practice. Highly developed hand-eye coordination is a necessity for musicians, as two of its principles involve precision and accuracy. Combined, all these traits help a player better establish and refine their musical technique. Musicians must engage their bodies and develop physical attributes similar to those in less traditional, yet Olympic-recognized sports, in order to enhance their musicianship. This can be further advanced by incorporating the detail-oriented training strategies used by athletes, which can help maximize efficiency and foster growth during practice.

Note: Esports, or online multiplayer video games played competitively, competitors are also beginning to be known as athletes due to the regular training conducted to achieve a high level of dexterity and coordination necessary to win,[52] further supporting the claimed expansion of the definition for athlete.

[51] Sarah Zulkiflee. "Are Esports Players Athletes?" *Esports.gg*, November 21, 2022, https://esports.gg/opinion/esports/are-esports-players-athletes/.
[52] Ibid.

ADAPTING AN ATHLETE'S TRAINING SESSION TO A MUSICIAN'S PRACTICE SESSION

Athletes adopt various training methods tailored to optimize their performance in their designated activity. When designing their workout routines, athletes take slow and fast-twitch muscle development into consideration as this determines the type of strength that is developed. Most systems of training follow a routine that uses a set number, or range, of repetitions that is repeated multiple times in the form of a set. For example, to achieve explosive power in the legs a football lineman may train their quadriceps by doing heavy weighted squats at a lower rep count, which would increase the capacity of their fast-twitch muscle fibers. Meanwhile, a marathon runner may jog at a moderate pace over a longer period to develop their slow-twitch muscle fibers.

For musicians, developing a practice schedule adapted from an athlete's training routine requires knowing what musical or physically oriented functions need improvement. This is accomplished by recording the needed areas of improvement at the end of one's practice session into a journal. Doing this may help determine the cause of certain issues and assist in finding an appropriate solution. Regardless of the approach, mindful repetition and setting an intention is imperative in maximizing one's time and can be further helpful by establishing the habit of journaling.

Journaling in music is similar to keeping a diary, as one reflects and writes down how their practice session went in specific detail.[53] Doing so enables a musician to better identify areas in need of improvement and can lead the player to think of problem-solving strategies that address those issues. Additionally, any questions or creative ideas that arise can be included so they may be discussed amongst colleagues or teachers. Journaling must be completed at the end of a practice session to help with memory retention. Waiting to do this at the start of the next practice session may leave out important pieces of information that could help improve one's playing. Completing this task at the end of a practice session can be challenging, as a musician's schedule might be busy, but doing so helps cultivate the important life skills of accountability and discipline.

When identifying issues with one's playing, journaling grants the player time to think about a solution before the next practice session. However, determining the cause of a playing-related issue during a practice session can be tricky, especially when practicing alone. When unsure of how to proceed, pausing and performing a self-analyzation of one's setup, positioning, and movements may help to indicate the root of a problem. Additionally, setting an intention to find a solution helps create a purpose towards how one should use their time in the moment most efficiently. Not every approach will fix the issue, but it will push the player to think and explore other options to overcome the challenge.

[53] Serap Bastepe-Gray and Christine Guptill, "Safe Practices in Rehearsing & Training," (presentation, Performing Arts Medicine Association: Essentials of Performing Arts Medicine – Arts Educator Certificate, Online, July 2024).

By staying focused and purposeful in practice sessions, time is used more efficiently, and progress becomes more achievable. This can be even further enhanced by directly applying the awareness developed from the skills provided by the Alexander Technique and Body Mapping.

FURTHER ADAPTATION TO RECITAL AND AUDITION PREPARATION

An athlete's detailed workout session also structures their training around specific goals, such as preparing for competition. Musicians follow a similar approach when preparing for significant events, such as recitals and auditions. Each organized approach varies in focus and strategy, especially based on the discipline, but for musicians, these events are tailored differently to achieve optimal results.

RECITAL PREPARATION

For a recital it is important to build mental fortitude and physical endurance as any negative emotions—such as stress, fear, or anxiety—will be amplified on stage and take a substantial toll on the body. The two weeks leading up to the event should be scheduled to prioritize building endurance, musicality, and comfort through full performances of the intended program. This preparation period can be organized into the following format:

1. Days one to seven should consist of completing four full run-throughs fostered with light touch up work on sections that are still musically or technically lacking.

2. Days eight to eleven consist of two days that have two full run-throughs. These sessions should be spread apart by a six-to-eight-hour break to reduce the physical toll on the body.
3. Days twelve and thirteen might be the most important days of this schedule as they are meant for rest. The previous days will strain the body and taking this time off allows one to recover. If it is impossible to fully rest due to other obligations, such as a rehearsal, one should be mindful to not overexert themselves.
4. Day fourteen is the day of the recital and only the four-to-six-hours leading up to the event should be spent preparing for the program. Targeting challenging excerpts from the repertoire slowly and diligently, then gradually increasing the tempo to a performance level is an organized way to help guarantee success.

Avoiding over-practicing on the day of the recital can be particularly challenging, as anxiety or nervousness may create a strong urge to continue practicing in pursuit of perfection. However, giving in to this urge can be counterproductive, potentially causing fatigue and diminishing the performance's quality. It is essential to trust the preparatory process, as it was thoughtfully designed to ensure success. By relying on the work already accomplished, the performer can approach the stage with confidence and poise, ready to deliver their best.[54]

[54] Susan Cahill, "Recital Preparation," (adapted lecture, Private Music Lesson, University of Colorado Boulder, Boulder, CO, February 2024). Adaption made to allow more time for rest and to reduce stress.

AUDITION PREPARATION

Audition preparation is different compared to a recital, as one must demonstrate their ability to perform excerpts from symphonies in quick succession with the period style and intentions of the composer. Building endurance and dexterity are important aspects to consider and can be achieved through adapting the plan laid out in the previous Recital Preparation section. In tandem with this, performance experience is gained through conducting mock auditions. There are different forms for these, but some of the most important involve identifying one's stressors and working towards accepting and navigating around them. One common example is the stress that is endured when performing in front of others. It could vary in intensity and possibly manifest into a physiological form, which could alter the outcome of an audition. Therefore, learning how to positively respond to one's stressors before the actual audition is important as it grants one the chance to make a constructive plan for success.

Navigating the heightened feelings of anxiety, fear, and stress commonly experienced by musicians prior and during a performance requires a structured, intentional approach. Mindfulness techniques, such as meditation and specialized breathing exercises, can help mitigate these emotions, but they must be practiced regularly to yield their full benefits. These mind and body strategies will be explored more in detail later into the document. Prior to performances, a specialized pre-show routine incorporating mental affirmations and visualization exercises can help reinforce confidence. During moments of on-stage stress, focusing on specific, actionable goals—such as maintaining a steady rhythm—can redirect one's attention away from anxiety.

These strategies, combined with a positive outlook, can help musicians navigate and even transform performance-related stress into moments of authentic musical expression.

Psychological stressors can be navigated with proper preparation and prevent certain physiological manifestations from occurring, but there are some factors that cannot be controlled. For example, one uncontrollable condition is the temperature of the audition space. Being too hot may cause sweat to form and can cause slips, while being too cold can decrease blood flow and slow down the body. For this reason, conducting multiple mock auditions in different environments will prepare your body for many of the unforeseen possible outcomes. Holding three mock auditions is an ideal goal to aim for, but there is no harm in doing more.[55] Peter Cooper, Senior Instructor of Oboe at the University of Colorado Boulder, won the principal oboe position in the Colorado Symphony Orchestra after taking nine mock auditions.[56]

Taking a music audition is a challenge, but winning one is an even greater accomplishment. However, by building key physical traits, such as endurance, and conducting mock auditions, musicians can enhance their likelihood of success. Identifying one's stressors prior to an audition and having a plan for navigating through these psychological and physiological performance-related responses helps ensure success and will be further explored later in this paper.

[55] Peter Cooper, "Some Thoughts on Auditions," (paper presented at Audition Workshop, University of Colorado Boulder, September 25, 2023).
[56] Peter Cooper, (presentation panelist, Audition Workshop, University of Colorado Boulder, September 25, 2023).

ADVOCATING FOR PHYSICALITY AND OTHER IMPORTANT FACTORS TO CONSIDER

Meeting a minimum threshold of physical capability is required to play the double bass. Neglecting this aspect could result in poor approaches or non-advantageous positioning, such as dropping the left elbow while in the lower positions of the instrument. Maintaining a regular practice schedule stimulates the body enough to meet this threshold but surpassing the minimum can lead to positive returns in one's playing.

Becoming physically active is often associated with frequent gym visits and weight-related workouts. While these activities are effective for building strength and endurance, they typically emphasize raw strength over functional strength. Raw strength primarily targets extrinsic muscles and often neglects the intrinsic muscles. This focus is essential for many athletes in contact-sports, as it enables them to lift or move heavy loads and frequently results in increased muscle size.

In contrast, functional strength targets both intrinsic and extrinsic muscles, with a greater emphasis on the intrinsic muscles. For musicians, developing functional strength is particularly important as it directly supports the controlled movements necessary for producing a well-rounded sound. Functional strength can be cultivated through consistent physical activity, and while weightlifting is a helpful method, it is not necessarily the only option. Cardio-based activities, such as running, and low-impact exercises, like Tai-Chi or yoga, are excellent alternatives that can enhance a musician's overall physicality. Exercise can positively influence one's mental health through the release of endorphins. Ultimately, the key is to keep the body active and engaged.

In a private interview with Joseph Conyers, principal bassist of the Philadelphia Orchestra, we discussed how to achieve a more powerful sound while playing. Mr. Conyers said, "Power is about efficiency and using weight and gravity to get the maximum output that you want. Some people consider that it is easy for me (due to his background and size from weightlifting and bodybuilding), but I have taught many students much smaller than me… who can create a massive sound (from their instrument) just because of the efficiency of how they can pull the bow across the string."[57] Efficiently playing the double bass depends on how one uses their body's size in the most advantageous way possible. However, having a more physically developed body may assist in this process.

Mr. Conyers' physically developed body may enable him to harness its potential in a way that enhances his performance. With his career success and his role as a principal player in a world-class orchestra, this evidence suggests that bassists who develop a larger, stronger physique may produce a more powerful sound. Exercise routines that prioritize developing functional strength better equip a performer while also concurrently reducing the risk of injury. Additionally, being physically active can improve many aspects of one's health, including various forms of endurance.

The cardiovascular system is overlooked by string musicians. The lungs are not needed to produce sound from these instruments and the heart's functionality can meet the minimum required threshold of activity needed to play these instruments through

[57] Joseph Conyers. "Body Wellness and Double Bass," by Kurt Melendy, private interview, online, October 26, 2023.

practicing and performing. Although this system can be stimulated this way, superseding this level by developing the heart and lungs through exercise can establish stronger physiological and psychological capabilities. Engaging this system can take on many different forms and can be fun for the individual, as the main goal is to stimulate this system and have it pump oxygen-rich blood throughout the body. The amount of time one should exercise depends on one's age and the intensity of the workout. However, a general guideline created by the American Heart Association is to complete 150 minutes of moderate intensity physical activity per week.[58] This is defined as elevating one's heart rate between 50 to 70% above its resting rate.[59] The 150 minutes could be divided into different ways, such as five 30-minute sessions throughout the week,[60] demonstrating that there are flexible approaches towards achieving this goal.

When starting a regiment to become physically active, soreness may occur. Light stretching may alleviate some of the discomfort caused by the buildup of lactic acid in the muscles, but taking time to rest and recover after exerting oneself is the most helpful way to address this. If one's level of activity is getting in the way of their ability to perform, then an adjustment is necessary, as playing with comfort should always be highly prioritized.

[58] Lauren Mellet and Gisele Bousquet, "Heart-Healthy Exercise," *Circulation* 127, no. 17 (2013): e571-2, accessed August 30, 2024, https://doi.org/10.1161/CIRCULATIONAHA.112.000880.
[59] Mayo Clinic, "Exercise Intensity: How to Measure It," *Mayo Foundation for Medical Education and Research*, August 25, 2023, https://www.mayoclinic.org/healthy-lifestyle/fitness/in-depth/exercise-intensity/art-20046887.
[60] Cleveland Clinic, "How Often Should You Work Out?" *Cleveland Clinic*, January 12, 2023, https://health.clevelandclinic.org/how-often-you-should-work-out.

Double bassists would be well served by adapting an athletic mindset, considering the physical demands involved with playing the instrument. Developing an approach to training, both musically and physically, that is adapted from a sports athlete's blueprint has expansive possibilities for increasing one's efficiency and level of playing. Overworking oneself in either regard can lead to negative consequences, so rest must be employed to allow the body time to recover. With better planning, less ambiguity can form which opens the possibility for musical growth.

PSYCHOLOGICAL ASPECTS

The arts often involve performing in public, which can elicit a wide variety of complex emotions, including stress and anxiety. These negatively connoted emotions are found throughout all levels of skill in the music field and are substantially aroused through high stakes scenarios, such as performances and auditions. For example, anxiety may result in a lack of concentration or self-doubt, which could ultimately affect one's success in either of these settings. Individuals that experience these effects must develop an approach to navigate through these episodes when they arise by adopting mindful and organized practices designed to support their mental health. These responses are almost impossible to completely remove from one's life,[61] but can be mitigated with a proper course of action, such as implementing breathing or meditation techniques. These techniques will be discussed in more detail in the next section.

[61] Melanie Greenberg, "Why We Can't Just Get Rid of Anxiety & Distress," *Psychology Today*, March 26, 2013, https://www.psychologytoday.com/intl/blog/the-mindful-self-express/201303/why-we-cant-just-get-rid-anxiety-distress.

Mindfulness manifests in various forms, and for musicians, it should be incorporated into both practice with and away from the instrument. By applying this self-exploration in both contexts, musicians can clarify and address the ambiguity that often arises during practice, while simultaneously increasing their productivity.

PRACTICING AWAY FROM THE INSTRUMENT

Society has evolved to be fast-paced and overwhelming, and these characteristics can easily take a toll on a musician's well-being. For example, the brain can have as many as 60,000 to 70,000 thoughts per day, and most of these thoughts are the same from the day before.[62] Not all these thoughts will pertain to one's music career yet still may act as a distraction that impacts one's musicianship when practicing. Taking time to embody a sense of calmness and ease is an important aspect of leading a healthy lifestyle as a musician. However, establishing a calm and relaxed mindset, especially when overstimulated, takes a long time to achieve without implementing a plan designed to mitigate these emotions. One of the techniques that could be included in this plan is meditation.

[62] Kimberly Holland, "Intrusive Thoughts: Why We Have Them and How to Stop Them," *Healthline*, last reviewed May 20, 2022, https://www.healthline.com/health/mental-health/intrusive-thoughts#outlook; Cleveland Clinic, "Brain," *Cleveland Clinic*, last reviewed March 20, 2022, https://healthybrains.org/brain-facts/; Sandy Loder, "The Impact of 45,000 Negative Thoughts," *Peak Dynamics*, March 10, 2023, https://insights.peak-dynamics.net/post/102ia4i/the-impact-of-45-000-negative-thoughts.

MEDITATION

Meditation can balance one's overall well-being by removing distracting thoughts while instilling inner peace.[63] When practicing meditation, it is recommended that one position themself in a quiet and removed space. Sitting upright is encouraged as it promotes spinal alignment, which enhances breathing and helps maintain alertness, minimizing the tendency to fall asleep. However, if sleep does occur during meditative practice, it often signals a need for rest. The eyes can be in a downward, unfixed gaze or completely closed.[64] At the start of the practice, focusing on each inhale and exhale helps bring the mind into the present moment, making it easier to clear the mind of distractions. If a thought arises, it is effective to observe it then let it go without attachment. At the end of the session, it is important to take a moment to sit quietly, as this allows both the mind and body to seamlessly transition back into the day. Consistency and patience are essential for making meditation a habit. Scientific studies have shown that meditating daily for eight weeks can make significant improvements in brain functions related to memory, sense of self, empathy, and stress reduction, highlighting its importance.[65] This skill takes time to develop, particularly in making it productive. Patience and kindness towards one's efforts are essential in fostering this progress.

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[63] Mayo Clinic, "Meditation: A Simple, Fast Way to Reduce Stress," *Mayo Foundation for Medical Education and Research*, December 14, 2023, https://www.mayoclinic.org/tests-procedures/meditation/in-depth/meditation/art-20045858.
[64] Emily Cronkleton, "Meditation Poses: In Your Desk Chair, on the Floor, and More," *Healthline*, last modified May 24, 2017, https://www.healthline.com/health/mental-health/meditation-positions#sevenpoint-meditation.
[65] Sue McGreevey, "Eight Weeks to a Better Brain," *The Harvard Gazette*, January 21, 2011, https://news.harvard.edu/gazette/story/2011/01/eight-weeks-to-a-better-brain/.

Consistently practicing meditation maximizes its efficacy, allowing sessions to be integrated into one's daily routine and adjusted in length to best accommodate one's schedule. Busier days might require a briefer five-to-ten-minute session while days with less obligations could allow up to an hour-long session. For those unsure where to start or seeking to deepen their practice, free guided meditation sessions available online can offer helpful direction.

SPECIALIZED BREATHING PRACTICES

Specialized breathing practices stem from ancient traditions, and modern science has confirmed the efficacy of these practices, suggesting that they can be powerful tools for the mind and body. When practiced effectively, some can stimulate a calming response which can reduce one's heart rate and stress level, while also balancing out the levels of oxygen and carbon dioxide in the body.[6683] The following techniques are some that have proven to be helpful in stimulating relaxation.

Ujjayi Breathing

The Sanskrit word *ujjayi* refers to a breathing technique commonly used in *pranayama*, the yogic practice of breath control. It is often incorporated into yoga sessions that emphasize stillness and focus, though it can also be practiced independently.[67] Ujjayi

[66] Better Health Channel, "Breathing to Reduce Stress," *Victoria State Government*, accessed October 23, 2024, https://www.betterhealth.vic.gov.au/health/healthyliving/breathing-to-reduce-stress.
[67] Scott Frothingham, "Benefits of Ujjayi Breathing and How to Do It," *Healthline*, last modified September 19, 2024, https://www.healthline.com/health/fitness-exercise/ujjayi-breathing.

is sometimes called "ocean breath" or "whisper breath" due to the soft, soothing sound it produces. There are some similarities to the "Whispered Ah" vocal procedure developed by Alexander, as both involve producing a controlled, continuous, and audible breath to promote relaxation and awareness.[68]

Ujjayi Breathing can be practiced utilizing the following steps: begin by exhaling fully. On the next inhale, close the mouth and breathe deeply through the nose. Once the lungs are completely filled, keep the mouth closed and exhale while gently narrowing the throat to create a sound reminiscent of ocean waves or wind. Concentrate on maintaining a steady rhythm, ensuring that each inhale and exhale are of equal length. Repeat this process for a minimum of two minutes to achieve optimal results.[69]

Bhramari Breathing

Also a derivative from the yogic practice of *pranayama*, this technique invites humming into a breathing session to soothe the nerves, with the pitch determining where it is most felt in the body. The word *Bhramari* comes from the Sanskrit language and translates to “female bee.”[70] The naming for this technique comes from the low-pitched humming sound created by female black bees when flying.[71] Research also shows that cognitive performance, among other things, improves when practiced regularly.[72]

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[68] Ron Murdock, *"Alexander Technique: The Whispered Ah,"* YouTube video, uploaded April 26, 2009, timestamp 2:42, https://www.youtube.com/watch?v=J1ga2ThmuE8.
[69] Frothingham, “Benefits of Ujjayi Breathing,” 2024.
[70] Shvasa Editorial Team, “How to Practice Brahmari Pranayama,” *Shvasa*, accessed October 23, 2024, https://www.shvasa.com/yoga-blog/how-to-practice-brahmari-pranayama.
[71] Ibid.
[72] Shivani Nautiyal, Surendra Prasad Rayal, and Abhishek Kumar Bhardwaj, “The Effect of Om Chanting, Bhramari Pranayama, and Nadi Shodhana Pranayama on Cognitive Functions Among Medical Students: An

For this practice, one should exhale fully, releasing the air from the last breath. On the next inhale, close the mouth and breathe in deeply through the nose. During the exhale, keep the mouth closed and gently hum, paying attention to the vibrations felt in the face and head. Different frequencies of humming will shift where the vibrations are felt in the body; lower frequencies are more noticeable in the abdomen, while higher frequencies will be more apparent in the head.[73] Repeating this process for a minimum of two minutes is recommended to achieve optimal results.

Note: *Bhramari* can be intensified by adding *shanmukhi mudra*. This involves placing the fingers and thumbs on the face in specific positions to amplify the vibrations experienced from humming. The traditional placement involves putting the first fingers on the eyelids, second fingers on the sides of the sides of the nose, third fingers on the upper lip, and fourth fingers on the lower lip. The thumbs should be placed on the tragus of each ear, or the small, pointed part that protects the ear canal. Closing the ear canal with the tragus alters the intensity of the resonance experienced.[74]

Experimental Trial," *Yoga Mimasa* 56, no. 1 (2024): 21-26, accessed October 24, 2024, https://doi.org/10.4103/ym.ym_13_24.

[73] Shvasa Editorial Team, "How to Practice Brahmari," 2024.

[74] Timothy McCall, "5 Ways to Practice Bhramari," *Yoga International*, accessed October 23, 2024, https://yogainternational.com/article/view/5-ways-to-practice-bhramari/.

Box Breathing

Box breathing involves taking equal amounts of time with inhalation and exhalation, and the time in between each action. It is used to calm the nerves and relieve stress and is practiced by the general population, professional athletes, and military personnel throughout the world.[75] Many variations of this practice exist, including extended box breathing, 4-7-8 breathing, and *nadi shodana*, or alternate nostril breathing.[76] These alternative practices are more advanced as they involve extending or limiting the breath but studies indicate positive aspects, including lowered stress, cardio system improvements, and the promotion of self-well-being.[77]

To experience the foundational level of box breathing, one should begin by fully exhaling, releasing all the air from their last breath. On the next inhale, breathe in slowly while counting to four. Once the lungs are filled, one should hold their breath for a count of four. Then, exhale steadily to a count of four. Once the lungs are empty, hold this state for

[75] Ana Gotter, "Box Breathing," *Healthline*, last modified June 17, 2020, https://www.healthline.com/health/box-breathing.
[76] Sheryl Ankrom, "These 9 Breathing Exercises Can Help Relieve Anxiety," *VeryWell Mind*, last modified September 17, 2024, https://www.verywellmind.com/abdominal-breathing-2584115#toc-4-7-8-breathing; Emily Cronkleton, "What Are the Benefits and Risks of Alternate Nostril Breathing?" *Healthline*, last modified May 24, 2023, https://www.healthline.com/health/alternate-nostril-breathing.
[77] Ibid; G. Sunil Nalik, GS Gaur, and GK Pal, "Effect of Modified Slow Breathing Exercise on Perceived Stress and Basal Cardiovascular Parameters," *International Journal of Yoga* 11, no. 1 (2018): 53-58, accessed December 31, 2024, https://doi.org/10.4103/ijoy.IJOY_41_16; Iffat Jahan, et al, "Effects of Alternate Nostril Breathing Exercise on Cardiac Functions in Healthy Young Adults Leading a Stressful Lifestyle," *Journal of Population Therapeutics and Clinical Pharmacology* 27, no. 4 (2020): abstract, accessed December 31, 2024, https://doi.org/10.15586/jptcp.v27i2.675; Chirag Hakked, et al, "Yogic Breathing Practices Improve Lung Functions of Competitive Young Swimmers," *Journal of Ayurveda and Integrative Medicine* 8, no. 2 (2017): 99-104, accessed December 31, 2024, https://doi.org/10.1016/j.jaim.2016.12.005; Anupama Tyagi, and Marc Cohen, "Yoga and Heart Rate Variability: A Comprehensive Review of the Literature," *International Journal of Yoga* 9, no. 2 (2016): 97-113, accessed December 31, 2024, https://doi.org/10.4103/0973-6131.183712; Apar Avinash Saoji, B. R. Raghavendra, and N. K. Manjunath, "Effects of yogic breath regulation: A narrative review of scientific evidence," *Journal of Ayurveda and Integrative Medicine* 10, no. 1 (2019): 50-59, accessed December 31, 2024, https://doi.org/10.1016/j.jaim.2017.07.008.

another count of four. These periods of counting must be exact rather than approximate to achieve maximum benefit, as many people tend to elongate or shorten their counting based on feelings rather than real-world time. Repeating this process for a minimum of two minutes is recommended to achieve optimal results. [78]

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One of the main goals of these and other specialized breathing techniques is to instill calmness. One may lie down while performing them if that is more comfortable and extend the length of the session as required by the individual. These breathing techniques can also be employed in Constructive Rest, a strategy utilized in Alexander practice that focuses on self-observation while lying on the floor in a semi-supine position.[79] As is the case with all breathing exercises, it is important to take precautions and regulate breathing if any dizziness or other side effects occur. If discomfort persists, stop the exercise and consider consulting a healthcare professional.

Rest is vital for both physical and mental recovery, yet it is often neglected by bassists, due to factors such as late-night rehearsals and performances. Sleep is crucial for maintaining an optimal level of health. The quality of sleep can be influenced by many various factors, including physical activity. Regular exercise promotes a more restorative sleep cycle, as the body requires both physical and mental recovery. Post-exercise the body enters a recovery state, even before it is time to sleep. During this period, brain activity naturally decreases, helping to alleviate stress and anxiety. This process not only

[78] Gotter, "Box Breathing," 2020.
[79] Barbara Conable, "Five Tasks of Constructive Rest," manuscript in the author's possession, 2014.

aids mental relaxation but also enhances cognitive function and physical endurance, ultimately improving overall performance.

Competitiveness, financial instability, and physical and mental strain within the music industry are major factors contributing to the negative emotions many musicians experience, which can significantly impact their mental health. However, by incorporating meditation and specialized breathing practices into one's routine and recognizing the need for rest, psychological balance can be restored. In moments when emotional responses become overwhelming, focusing on breath control or meditating can help instill calmness and reduce one's cognitive overload. Combining these techniques with aspects of the Alexander Technique and Body Mapping fosters heightened self-awareness, which is directly transferable to both practice and performance.

PRACTICING WITH THE INSTRUMENT

Musicians who plan their practice schedules set clear objectives, fostering an organized environment that ensures focused progress by defining what needs to be accomplished in each session. Creating a schedule does not need to be overly complex but does require the next session's practice schedule to be planned at the end of the current practice session rather than before the start of the next. Adopting this pattern allows one to more efficiently and memorably record detailed reflections in their journal

about how the previous session went.[80] Completing this task at the end of a practice session can be challenging, as many musicians are eager to move on to their next commitment or looking to rest after finishing their work.* However, by maintaining discipline, one can cultivate a positive and constructive habit that could revolutionize their practice efficacy.

HABITS

Habits are regular tendencies or practices that have been solidified into one's lifestyle.[81] Regarding musical experience, the span of time widely regarded to be the habit-forming stage is 14 to 21 days. However, a researcher by the name of Phillippa Lally, a specialist in health psychology at University College London, led a study seeking to more accurately determine how long it takes to form a habit. The study lasted for 12 weeks, and 96 participants were involved. Each was asked to choose a new habit that they wanted to adapt into their lifestyle and were instructed to practice it daily and to report their progress. Results revealed that it takes on average about 66 days for a new behavior to become

***Note:** Musicians should incorporate and develop this into a strong habit early on to have the greatest potential for success.

[80] Serap Bastepe-Gray and Christine Guptill, "Safe Practices in Rehearsing & Training," presented at Performing Arts Medicine Association: Essentials of Performing Arts Medicine – Arts Educator Certificate, Online, July 2024.
[81] Merriam-Webster, s.v. "habit," accessed October 14, 2024, https://www.merriam-webster.com/dictionary/habit.

automatic, indicating that establishing a new habit takes longer than originally believed. Additionally, the study found that infrequently missing an opportunity to perform their task did not significantly hinder its development, emphasizing that the creation of a new habit is not an all-or-nothing endeavor.[82]

While the process of establishing and dismantling habits can be challenging, creating a habit becomes more manageable by practicing the insights shared in *Atomic Habits* by James Clear. In the book, Clear recounts how he overcame a severe high school injury and describes the process he took to rebuild his life. Drawing on his personal experiences and extensive research, he developed four laws to simplify both habit formation and habit breaking.[83] These laws are:

First Law:
Make It Obvious

Second Law:
Make It Attractive

Third Law:
Make It Easy

Fourth Law:
Make It Satisfying

By using these strategies, the likelihood of successfully establishing a beneficial habit greatly increases. For example, creating the habit of journaling after a practice

[82] Phillipa Lally, et al. "How Are Habits Formed: Modelling Habit Formation in the Real World," *European Journal of Social Psychology* 40, no. 6 (2009): 998-1009, accessed October 14, 2024, https://doi.org/10.1002/ejsp.674.
[83] James Clear, *Atomic Habits,* (New York: Penguin Random House, 2018), 4-213.

session with the intention of identifying areas in need of improvement invokes the principle of making it obvious. Making it attractive may involve rewarding oneself. For example, after completing the task, one might be allowed thirty minutes of free time. Making it easy could be as simple as keeping the journal within arm's reach and having a designated pencil specifically meant for writing in that notebook. Making it satisfying relates to one's individual personality. For example, one could make their journaling into some sort of game or could position themselves in an enjoyable environment, such as the outdoors.

These small steps can have a significant impact on an individual's life when trying to form a new habit and do not require an overwhelming amount of effort. However, this is easier said than done as humans tend to resist change. "Our bodies' complex inertia, or resistance to change, is important for maintaining a state of equilibrium known as homeostasis" (Ryback, MD).[84] Any disruptions to the body's homeostasis—such as changes in heart rate, metabolism, and respiration—even if positive, can create psychological conflict.[85] However, if one is able to consistently perform a desired behavior for eight weeks, as declared by Lally, a habit has a more likely chance to form, transforming the action into a more automatic behavior.

[84] Ralph Ryback, "Why We Resist Change," *Psychology Today*, January 25, 2017, https://www.psychologytoday.com/us/blog/the-truisms-of-wellness/201701/why-we-resist-change.
[85] Ibid.

SMART PRACTICING TECHNIQUES

After planning a practice session, it is important to determine what techniques to utilize as different practice designs complement different goals. When unsure of what to prioritize, it can be helpful to reference *The Learning Diamond* created by the famous jazz pianist, Kenny Werner. This device was designed to help musicians master their instrument through concentrated and intentional practice.[86] Each corner of the diamond represents an intention that can be followed and used during practice sessions to help achieve certain goals.[87] Playing effortlessly is deliberately placed at the top of the diamond in the diagram because it should always be prioritized. The other corners of the diamond have the following titles:

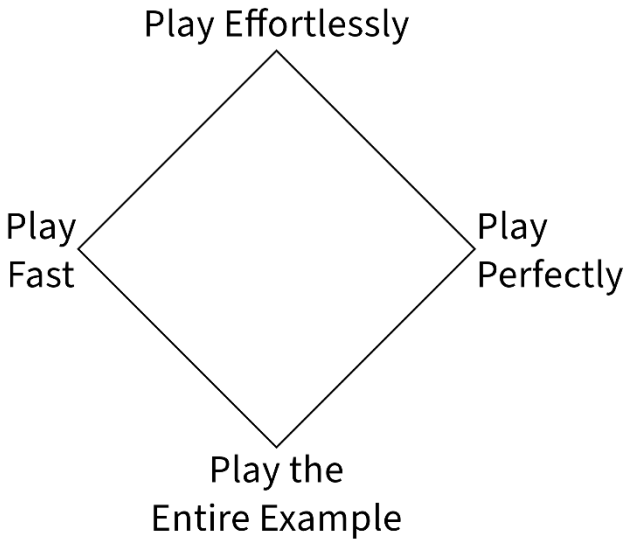

Figure 12: *The Learning Diamond*. Diagram created by Kenny Werner, 1996.

[86] Kenny Werner, *Effortless Mastery* (New Albany: Jamey Aebersold Jazz, 1996), 161-4.
[87] Ibid.

Each of these traits can be practiced independently or combined with up to two other traits. However, "play effortlessly" must always be included when grouping these qualities, as it is the primary goal to achieve in performance. Grouping these traits together requires prioritizing some qualities while sacrificing others. For example, if the goal is to practice an exercise from beginning to end, fast, and effortlessly, then a sacrifice to playing it perfectly needs to be made.[88] Achieving these set, balanced goals will, in turn, support the larger, overall learning process of a piece, reinforcing that this diagram serves as an excellent practice tool for providing structure to practice sessions.

Once the material is prepared and ready to be presented, it is common for one to demonstrate their work through a performance. Prior to the performance, it can be beneficial to evaluate one's achieved level in the hopes of avoiding unforeseen mishaps that could be caused by a loss of focus or uncontrolled emotional responses. Measuring this proficiency can be done with Jason Sulliman's evaluative system titled the Four Levels of Success.[89]

Four Levels of Success:

Mastery: I play easily.

Proficiency: I play well.

Competence: I can play well.

Survival: I have played well.

[88] Ibid,162.

[89] Jason Sulliman, "Why Fast, At-Tempo Practice Can Be More Efficient and Effective Than Slow Practice," interview by Noa Kageyama, *Bulletproof Musician*, podcast conversation, October 4, 2020, https://bulletproofmusician.com/jason-sulliman-on-why-fast-practice-can-be-more-efficient-and-effective-than-slow-practice/?highlight=sulliman. Information formatted from the podcast.

This evaluative system puts a realistic perspective on a musician's level of preparation by evaluating the work completed prior to a big event. It can also serve as a motivational source as it questions one's proficiency in every aspect pertaining to the music. For instance, pausing to evaluate whether a challenging section meets one's expectations can encourage the utilization of a more thoughtful approach, prompting the player to work on the section with refined technique until greater satisfaction is achieved. Furthermore, implementing the Learning Diamond is an excellent way to stimulate this additional work and can help one to meet their expectations. It is also worth mentioning that the Four Levels of Success can also be used to evaluate recorded performances.

Reviewing recordings from past performances can be challenging as they capture all the positive and negative qualities that occurred. However, identifying and recognizing both of these qualities provides the performer with valuable insights into areas of their playing that they can work on improving. The "Mastery" level indicates an extraordinary understanding of the music and demonstrates an exceptional level of skill, but it is a difficult level to attain. However, by openly evaluating previous performances, new possibilities for obtaining improvement emerge.

Applying these techniques to a goal, such as winning an orchestral audition, can yield beneficial results by psychologically preparing the musician. Excerpts from symphonies are the main form of material used at auditions in the United States. Adapting one's playing style in quick succession is difficult but can become easier by establishing a calm and confident demeanor as this can assist with regulating the physical and mental manifestations that may arise on stage.

Having confidence in oneself and one's preparation plays a large part in achieving a positive, succeeding mindset. The word confidence is derived from the Latin word *confīdere*, meaning "to have full trust or reliance."[90] This means that confidence is based on trust.[91] Trusting in one's abilities, knowledge, and preparation allows one to experience a sense of security, reducing self-doubt. Without self-trust, even the most prepared individuals may struggle to perform with conviction at an audition. This connection between confidence and trust forms the foundation for many other qualities essential to performance.

Trust can take on many forms, but two ways it can be developed are through practicing meditation and using mantras. J.J. McCarthy, former quarterback for the University of Michigan, led his team to an undefeated season in 2023. Before every game, he would take at least ten minutes to meditate. Prior to the start of the championship game against the Washington Huskies, he was seen meditating in front of one of the goal posts.[92] In a press conference interview, McCarthy said, "I meditate before the game just to really get my mind set into that calmness... Meditation is just a way that helps promote that longevity of that present moment that I feel. When I feel like I'm not in the right headspace... I really just focus on my breath, and that starts to connect me to the present

[90] Online Etymology Dictionary, s.v. "confidence," accessed October 12, 2024, https://www.etymonline.com/word/confidence.
[91] Matthew Tomatz, "Developing the Whole Musician: Confidence Equals Trust," private lecture, University of Colorado Boulder, Boulder, CO, October 2024.
[92] Alexa Mikhail, "Michigan Quarterback J.J. McCarthy's Pregame Meditation Routine Helped Lead the Wolverines to Victory. Here's How It Works," *Fortune Well*, January 9, 2024, https://fortune.com/well/2024/01/09/michigan-quarterback-mccarthy-pregame-meditation-wolverines-victory/.

moment a heck of a lot faster."[93] McCarthy's brief ten-minute meditation before games is a beneficial habitual practice that helps him center himself by focusing his mind, calming his nerves, and clearing away distractions. By doing this he can set aside any pre-existing external pressures, enabling him to take on the demanding role of quarterback with a composed and confident mindset. Taking the time to clear the mind of doubt creates room for trust to bloom, and once trust is introduced, mantras can be used to help solidify these beliefs.

Mantras are words, sounds, or phrases that are used to make connections or express strong beliefs.[94] They originate from sacred traditions but can be used by musicians to focus their attention before performing. Pre-existing templates can be found online, but these are often too broad and need to be adjusted to be beneficial for the individual. Once a mantra has been designed, using it involves verbally repeating the phrase. This can be done internally, but has stronger implications when spoken aloud and especially when meeting one's own gaze in a mirror, as it reinforces the intention of the mantra, promoting self-awareness and a deeper connection with oneself.

Practicing can present challenges for musicians, as they are responsible for determining how to use their time productively. Periods of stagnation, where progress feels limited, can negatively impact mental health, but there are effective techniques—both with

[93] Christopher Breiler, "WATCH: JJ McCarthy Discusses Pregame Meditation, Depression, and Mental Health," *On SI: Michigan Wolverines*, October 10, 2023, https://www.si.com/college/michigan/football/michigan-football-wolverines-jj-mccarthy-mental-health-big-ten-meditation-depression.

[94] *Britannica Dictionary*, s.v. "mantra," accessed October 24, 2024, https://www.britannica.com/dictionary/mantra; *Cambridge Dictionary*, s.v. "mantra," accessed October 24, 2024, https://dictionary.cambridge.org/us/dictionary/english/mantra.

and away from the instrument—that have been discussed and can encourage continuous growth. Taking the time to be more mindfully centered with one's mental well-being can be achieved by dedicating time to breathing, meditation, and mantras, as these practices can help reduce the overwhelming number of thoughts experienced daily. Constructively structuring practice sessions increases efficiency, and systems of evaluation can better inform one of their true level of playing, which can allow one to foster a deeper connection with their musicianship and unlock greater musical potential. This sense of self-awareness and growth is particularly vital during auditions, where trusting in one's preparation can instill confidence, which could make all the difference in achieving success.

PLAYING COMFORTABLY, AVOIDING INJURY, AND RETURNING TO PLAY FROM INJURY

Playing with comfort has been a recurring theme throughout this paper, as it is often overlooked by bassists. When the body is uncomfortable, its capabilities are compromised, and neglecting to address this discomfort increases the risk of injury. Injuries, whether physical or mental, can be debilitating, ultimately compromising one's overall well-being.

If an injury occurs and there is any uncertainty or concern, it is crucial to consult a medical professional for proper guidance. Within the first 72 hours, health professionals widely recommend following the RICE method—Rest, Ice, Compression, and Elevation—

for soft tissue injuries* to help alleviate initial pain and discomfort.[95] Different medical acronyms, such as MICE—Movement, Ice, Compression, and Elevation—exist and are currently being studied by professionals to determine their effectiveness.[96] Initial observations have shown that implementing gentle, functional movement could be better than total rest, depending on the injury.[97]

Bassists have faced numerous playing-related injuries including carpal and ulnar neuropathy, tendonitis, rotator cuff tears, and herniated discs, which usually occur from repetitive strain caused by improper playing techniques. These injuries can range from mild discomfort to severe impairments, and extended recovery periods can occur when a recovery plan is inadequate. Appropriate recovery involves giving the body time to heal and requires a thoughtful approach to maintain productivity. Balancing rest with rehabilitation decreases the risk of long-term harm, but getting back to performing can only be achieved by implementing a return-to-play plan.

***Note:** Medical acronyms apply only to soft tissue injuries: serious injuries, like fractures or dislocations, require urgent medical treatment.

[95] Amy Gopal, "RICE Method for Injuries," *WebMD*, last reviewed April 24, 2024, https://www.webmd.com/first-aid/rice-method-injuries.
[96] Samuel Dunn, "Soft Tissue Injuries: Do You RICE, RICER, MICE, PRICE, or Just Do Nothing," *Lively Physiotherapy*, November 16, 2018, https://www.livelyphysiotherapy.com.au/the-blog/2018/11/16/soft-tissue-injuries-do-you-rice-ricer-mice-price-of-just-do-nothing.
[97] Ibid.

RETURN-TO-PLAY PLAN

Return-to-play (RTP) plans are specially designed programs that gradually reintroduce a player to performing after sustaining an injury. One example of a RTP plan, created by Richard Norris in 1996, can be found Figure 13. This incremental and regimented system provides valuable insight into a player's healing progress by dictating the frequency and duration of their practice.

Returning to work or play

Levels (3–7 days at each)	Play	Rest	Play	Rest	Play	Rest	Play	Rest	Play
1	5	60	5						
2	10	50	10						
3	15	40	15	60	5				
4	20	32	20	50	10				
5	30	20	25	40	15	45	5		
6	35	15	35	30	20	35	10		
7	40	10	40	20	25	25	15	50	10
8	50	10	45	15	30	15	25	40	15
9	50	10	50	10	40	10	35	30	20
10	50	10	50	10	50	10	45	20	30

- Start with slow and easy activity or pieces. Gradually progress to faster, more difficult tasks or pieces.
- In general, perform a maximum of 50 min continuous work or play with a minimum of 10 min rest.
- *Warm up* before working or playing!
- If pain occurs at any level, drop back to level of comfort until able to progress without pain.

Figure 13: Return to Work or Play strategy plan created by Richard Norris in 1996.

These detailed plans can effectively assist a musician in their recovery and reduce the ambiguity created by the insufficient advice to “go back little by little,” often given by clinicians (Norris, 90).[98] RTP plans need to be individually created to best suit one’s needs.

[98] Richard Norris, “Return to Play After Injury: Strategies to Support a Musician's Recovery,” *Work* 7, no. 2 (1996): 89-93, https://doi.org/10.3233/WOR-1996-7203.

However, many foundational plans currently exist and almost all share similar principles such as limiting pain-stable playing, introducing instrument specific rehabilitation strategies, addressing painful daily activities, and preventing re-injury.[99] The "Return to Play (RTP) Program Phases" is a three phase plan crafted by John Hopkins University faculty Serap Bastepe-Gray, MD, MM, MS, and Julian Gray during a certification course offered by the Performing Arts Medicine Association. The phases and their steps are outlined in Figure 14 below:

Return to Play (RTP) Program Phases

Phase 1: Pre-Repertoire	**Phase 2: Initial Return to Repertoire**	**Phase 3: Re-entry to Standard Repertoire**
Daily total pain-stable on-the-instrument time < 20 minutes	Daily total pain-stable practice time 20-40 minutes	Daily total pain-stable practice time > 40 minutes
On-the-instrument "theraputic exercises"	Short idiomatic pieces with graded exposure to loads	Short pieces of musicasl depth without extensize physical work
Incremental increase of 2-3 minutes every 4-5 days	Incremental increase of 3-5 minutes every 4-5 days	Incremental increase of 5-7 minutes every 4-5 days
Begin instrument modification and ergonomic adjustments to interface	Continue ergonomic adjustments and instrument modifications	Gradually remove ergonomic adjustments and instrument modifications
Refine biomechanics (technique) for increased efficiency	Continue to refine biomechanics (technique) for increased efficiency	Continue to refine biomechanics (technique) for increased efficiency

Figure 14: Return to Play (RTP) Program Phases outlined by Serap Bastepe-Gray and Julian Gray. Recreated for quality purposes.

[99] Ibid; Serap Bastepe-Gray and Julian Gray, "Return to Play Strategies," (presentation, Performing Arts Medicine Association: Essentials of Performing Arts Medicine – Arts Educator Certificate, online, July 2024).

Phase 1 is a rehabilitative step in the plan. Practice time is greatly reduced, and sessions are spaced out far enough to ensure adequate rest. For example, this may unfold as practicing two-to-three days per week for less than 20 minutes. Incremental increases in time of two-to-three minutes can be implemented every four-to-five days. The focus should be on maintaining pain stability, meaning there should be no increase in pain experienced during practice. Any increases are a direct sign to stop playing. During Phase 1, playing setup and technique should be revisited to see if there are more ergonomic positions to employ that better fit the body of the individual. Assignments, such as listening, score study, and musical analysis, can be used to keep a musician musically stimulated during these longer periods of downtime.

Phase 2 is akin to guided physical therapy, as one begins to recondition the body in small steps. Pain-stable practice time can be increased to three-to-four days per week and for 20-40 minutes per session. Practice sessions can also incrementally increase three-to-five minutes every four-to-five days. Repertoire can be re-introduced in the practice schedule, but should take the form of short, idiomatic pieces that are of low intensity in their technical level. The goal of this phase is to increase physical endurance through pain-stable practice while reinforcing habits that help prevent further exacerbation of the injury. Awareness and adaptations to one's positioning and setup should continue to be explored. Reading pedagogical literature, such as practice organization or efficient movement, may lead to self-discoveries helpful to the player.

Phase 3 is similar to a home exercise program that a physical therapist would give to a client who has made significant improvements and has become well-versed in the

exercises explored in-office but still needs a little more time to heal. Individuals at this stage are better versed at listening to their body and more knowledgeable about ergonomic positioning and setup, making them more adept at navigating their injury. Phase 3 allows for pain-stable practice time to be increased to three-to-five days per week and to 40-60 minutes per session. Practice sessions can also incrementally increase five-to-seven minutes every four-to-five days. Repertoire can again increase in difficulty and emphasize musicality but should not exceed the body's current capabilities. The player should continue to avoid working on challenging pieces if they are aggravating their injury. Alternative repertoire could consist of music that prioritizes control or builds endurance. A slow return to one's initial setup can be considered and implemented, and any external devices could be removed to help the player return to a more familiar positioning, but these changes must made mindfully, as they could have played a role in the initial cause of the injury. This phase can ignite enthusiasm in players as they approach the point of reestablishing their original practice and performance routine. However, with this renewed enthusiasm, it is essential to exercise extra caution to prevent the injury from worsening or becoming prolonged.

Injuries are common among musicians. A study conducted in Australia in 2012 found that 84% of professional orchestral musicians have experienced a playing-related injury.[100] It was also found that there was a 50% chance that a musician was playing injured

[100] Browen Ackerman, Tim Driscoll, and Dianna Kenny, "Musculoskeletal Pain and Injury in Professional Orchestral Musicians in Australia," *Medical Problems of Performing Artists* 27, no. 4 (2012): 181-87, accessed August 31, 2024, https://pubmed.ncbi.nlm.nih.gov/23247873/.

at any given time.[101] A more detailed study has not been conducted to prove that these numbers are consistent worldwide. However, there are implications that suggest a similarity.

Sustaining an injury does not necessarily prevent an individual from pursuing a career in music. However, how one addresses an injury is an important factor that helps determine when they can return to playing. When unsure about how to proceed with an injury, or if concerns arise, it is important to consult a physician. They are best qualified to assess the injury and may be able to assist in creating an appropriate plan to heal. Utilizing this important step-by-step process and avoiding moving forward too quickly, and consulting with medical professional is one of the most responsible ways a musician can ensure their healing and recovery.

CONCLUSION

Double bassists would benefit from establishing a dynamic connection between the mind and the body. Having a secure conception of anatomical structure and implementing concepts from the Alexander Technique and Body Mapping can yield positive results in the physical realm. While only five sections of the body were explored in the Body Mapping section, the practice can be extended to other areas, such as the feet and legs, which also can offer significant potential for players when properly utilized.

[101] Ibid.

Musicians are athletes. Playing an instrument demands proficiency in various physically oriented traits, such as agility and stamina, as well as non-traditionally measured attributes like precision and accuracy. This becomes even more pronounced for bassists due to the instrument's size and weight. Consequently, reaching a baseline level of physical capability is essential. However, evidence suggests that exceeding this baseline can lead to even greater success, as demonstrated by Joseph Conyers' accomplished career.

Adapting a training schedule, similar to that of a sports athlete, is a valuable approach for structuring practice sessions and for preparing for significant events, such as recitals or auditions. Complementing this with journaling further enhances the process, allowing the musician to reflect on areas needing improvement while encouraging deep problem-solving. This combination of structured practice and reflective journaling nurtures both technical growth and mental clarity, ultimately leading to better preparation and performance.

Being a musician comes with its share of challenges, including the psychological demands of performance. Mindfulness can be a powerful tool in addressing these challenges, as it fosters confidence, builds trust, and supports overall well-being, while simultaneously encouraging the development of practice habits, both with and away from the instrument.

Specialized breathing practices, meditation, and the use of mantras are powerful tools that can significantly improve a musician's mental focus, emotional regulation, and

overall performance. For J.J. McCarthy, meditation allows him to reduce external distractions and stress before each of his football games, demonstrating how mindfulness techniques can enhance performance in high-pressure situations. By incorporating these techniques into a regular routine, musicians can become better equipped to manage the psychological demands commonly encountered in their field.

The process of habit formation is gradual but requires consistent practice to become automatic behavior. Habits play a critical role in a musician's development, and understanding how they are formed can significantly impact progress. James Clear's Four Laws of Habit Formation offers musicians the ability to build and sustain positive practices both musically and personally. Phillipa Lally's research reveals that it can take an average of eight weeks for a new behavior to become automatic. This insight is especially valuable for musicians, who often expect quick results but need to allow time for real transformation. The process of habit formation is gradual, but by committing to consistent, mindful practice, musicians can foster lasting improvements in both their technical skills and overall well-being.

Smart practice techniques provide a more structured and holistic approach to musical development. *The Learning Diamond* is a valuable tool, as it emphasizes the importance of becoming technically proficient in the many aspects of mastering an instrument. Complementing this approach, Jason Sulliman’s four levels of success offer musicians a framework to evaluate their playing, whether in preparation for an event or while reflecting on a recorded performance. Both methods highlight areas that require improvement and prompt the player to deeply think and search for effective solutions. By

integrating these practice and evaluative techniques, musicians can foster long-term growth and mastery, ultimately leading to sustainable success.

Being more informed about body mechanics allows musicians to make mindful decisions that reduce the risk of injury, though it does not eliminate it entirely. Injuries are unfortunately common in the music profession, but they don't have to signal the end of a career. If an injury occurs, discomfort can initially be addressed by applying the medical acronym RICE, until it is possible to consult a physician. The physician can assess the severity of the injury and may assist in developing an appropriate return-to-play plan. While these plans vary, they generally share key principles, such as limiting pain-stable playing, introducing instrument-specific rehabilitation strategies, and preventing re-injury. By following a well-structured, comprehensive approach, most musicians should be able to return to performing and continue their careers sooner.

Comfort is the most fundamental concept to prioritize, especially for musicians, as it plays a significant role in the various aspects discussed in this paper. Ensuring that one's body is in a comfortable state during practice and performance enables more sustainable playing, reducing the likelihood of physical strain. This mind-body exploration is a lifelong endeavor with limitless potential for growth and success. By focusing on comfort, mindfulness, and physical awareness, musicians can unlock greater potential in their performance, overall well-being, and career.

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