

Anatomy and Physiology and Guitar Technique

Anatomy: The branch of science concerned with the bodily structure of humans, animals, and other living organisms, esp. as revealed by dissection and the separation of parts.

Physiology: the way in which a living organism or bodily part functions.

Kinesiology: the study of the mechanics of body movements.

Anthropometrics: The study of the measurements of the human body.

Biomechanics: the combination of biology and mechanics in the study of human action.

Ergonomics: the science that studies the fit between worker and work environment and tools.

Kinesthesia: awareness of the position and movement of the parts of the body by means of sensory organs (proprioceptors) in the muscles and joints.

Proprioception: relating to stimuli that are produced and perceived within an organism, esp. those connected with the position and movement of the body.

Proprioceptors: a sensory receptor that receives stimuli from within the body, esp. one that responds to position and movement.

Parts of the body most relevant to class discussions

Muscle: Contract (flex) and pull tendons to move joints and bones. **Agonists** are primary movers. **Antagonists** act in opposition to the **Agonists**. **Synergists** help by eliminating or reinforcing the action of the **Agonist**. **Stabilizers** act by immobilizing other joints that would move in reaction to the action exerted on the joint we want to move.

Tendons: Fibrous and non-elastic cord-like bundles of tissue attached to muscles which pull bones when muscles contract.

Joints: Connections between bones that allow movement. Diarthrodial Joints are fully movable joints between limbs. Joints can only move through the external pull of muscles (unless an external force is present, like gravity).

Nervous System: Controls movements of the human body.

Peripheral Nervous System: Controls muscular activity.

Afferent Branch: Branch of the peripheral nervous system. Inputs sensations received, both from the outer environment and from inside the body.

Efferent Branch: Branch of the Peripheral nervous system. Sends signals to the muscles telling them to contract, thus moving body parts.

Neuron: Nervous impulses are transmitted and received through neurons.

Efferent (Motor) Neurons: Carry impulses from the brain and spinal cord to the muscular fibers, producing contraction or relaxation.

Afferent (Sensory) Neurons: receive information in the form of sensations that is communicated to the spinal cord and brain.

Receptors: Respond to specific kinds of stimuli from the body's environment.

Exteroceptors: Sight, sound, smell, taste, and touch are the result of the impulses received by the cerebral cortex from exteroceptors placed in the tissues of the eye, ear, nose, mouth, and skin that perceive changes in the outer world.

Introceptors: receive information from the internal environment within the body.

Proprioceptors: monitor changes in the structures of the musculoskeletal system. They are present in muscles, tendinous attachments to muscles, and the in the joints and skin.

Kinesthetic (Motor, Muscular) Sense: Awareness of our body and its activities in the space surrounding us.

Muscle Metabolism: We breathe air and ingest nutrients in order to get the two main ingredients for muscle metabolism: oxygen and glucose.

Glucose: A form of sugar and raw material for the cells. Transformed into the necessary chemicals utilized in the metabolic cycle which culminates through a combustion-like process of oxygenation, in the production of **ATP (adenosine triphosphate)**, the fuel of muscular contraction. The amount of ATP needed by a muscle is directly related to the intensity of work it delivers when contracting. The more ATP is needed, the more nutrients (Oxygen and Glucose) have to be consumed by the cells. This is why we breathe more heavily and our heart pumps more when we are engaged in intense physical activity: the need for oxygen and nutrients increases. As muscles contract, the contraction makes it more difficult for the blood to deliver necessary nutrients to the cells that innervate the muscles. This is why consistent muscle contraction without brakes (relaxation) are more demanding and tiring. This is why developing the ability to relax muscular contractions between exertions while playing is important.

Types of Muscle Contraction:

Muscle Contraction: Muscles contract, thus changing their shapes, often from a more elongated to a more spherical one. A muscular contraction is the tensing up of muscle fibers produced as a response to a nervous stimulus.

Isometric (Static) Contraction: When muscle contraction does not result in joint motion.

Isotonic Contraction: When muscle contraction does lead to joint motion.

Static Work: The work of the muscles caused by holding a position.

Dynamic Work: The work of muscles caused by moving from position to position.

Active States/Attitudes: an active state is achieved through muscular effort.

Passive States/Attitudes: A passive attitude happens when a limb or limb segment moves or keeps still by the action of external force, most frequently gravity.

Tension: A word used commonly in the context of guitar technique to describe the following use of muscles (essentially tension is unnecessary muscular contraction):

1) Contracting muscles that are not needed during the execution of a guitar technique. An example is elevation of the shoulders, something never necessary in guitar playing.

2) Excessive contraction of a muscle that is needed but is overused during the execution of a specific technique. An example is hyper-flexion of the knuckle joints when plucking the string with the fingers.

3) Tension is also the feeling you get from flexing or extending the muscles (**isotonic tension**) or from holding a limb in place with a muscle (**isometric tension**) when it is not necessary to hold. Tension is felt in greater amounts as you **hyper-extend** or **hyper-flex** a muscle. Common **isotonic tension** is too much flexion of the knuckle joint. Common **isometric tension** is holding the pinky extended during finger-work. Tension can be seen when you visibly see the muscle flex or the joint hyper extend/flex and felt through the proprioceptive feelings (proprioception) you experience that results from the proprioceptors.

4) **Sympathetic Tension:** when the motion of a joint causes flexion or extension in other unrelated joints and their muscles, often to aid the intended action. Example of this is when motion of m (index finger) causes motion in a and c (ring and pinky). This type of tension is common in the hand as a result of motions of the thumb and fingers and must be eliminated or minimized.

5) **Static Stretching** and its associated feelings in the muscles being stretched also causes tension in the muscles. Now the muscle is being pulled, not contracting as it normally would.

-**Sympathetic Tension Map:** See my map on the separate handout on the website. A sympathetic tension map is where you move one individual finger joint consciously and then feel/see what other unconscious/unwanted motion occurs in the hand as a result of that initial motion.

Muscular Fatigue (Tension): The decline in the ability of a muscle to generate force.

Relaxation/Neutral: the absence or minimal existence of the different types of tension.

Movement: Holding a position, especially in the spine, is often a cause of tension. Movement releases tension. Thus movement of the spine while playing allows some muscles of the back and core to relax while others work, thus the work of keeping the spine in proper position is shared by all muscles. The relaxed spine is not a static position.

Poised Limb: The weightless, floating limb, ready for movement in any direction, through the perfect balance between the pull of gravity and the necessary muscular effort needed just to overcome it.

Fijación: In Spanish, this word literally means “fixation.” In guitar, Fijacion is term used by pedagogue Abel Carlevaro to describe executing a technique on guitar by using joint motion (and their muscles) other than **or** in addition too the joints/muscles that directly control the fingers (the metacarpal phalangeal joints controlled by the intrinsic hand muscles and the interphalangeal joints and controlled by the extrinsic forearm flexor and extensor muscles).

In the case of the thumb the Carpometacarpal, metacarpal phalangeal, and inter phalangeal joints and their respective flexor and extensor muscles are overridden or added to in fijacion. For example, if one were to pluck a string with the a finger not by using the knuckle or

finger joints but instead by flexing the elbow joint. The thumb stroke in which the elbow extends to aid the thumb creating a louder stroke is also an example.

Limb Supported Strokes: Same as Fijación. More modern terminology. This when action of the finger joints to displace (pluck) the string is replaced by wrist (deviation or flexion/extension), forearm (rotation), elbow (flexion/extension), or shoulder motion (horizontal flexion/extension).

Passive Flexion/Extension: Essentially this is Fijación in the context of the larger joints (shoulder, elbow, forearm, and wrist). Just like the wrist can flex to create a plucking of a string with the a finger, the same applies to the wrist motions that result from motions from the shoulder, elbow, and forearm.

An example of this is when flexion of the shoulder joint causes elbow to extend and forearm to pronate passively while the muscles that act upon the elbow and forearm are engaged minimally or not at all. I have made a map at the bottom of this handout that describes how each joint effects one another starting with the shoulder and going down to the fingers.

This concept is an example of passive attitudes/states mentioned above. Ultimately, Passive Flexion/Extension is mainly a result of gravity acting on the joint as a result of how it has been positioned by the larger joint. As the shoulder flexes and raises the wrist, gravity causes the wrist to passively flex.

Hand Arm Complex: A term used by guitarist and pedagogue Abel Carlevaro. It refers to the entire arm, its joints, and its motion. This means the shoulder joint, elbow, forearm rotation, wrist, and fingers and thumb. His point was to say that any playing of guitar must consider the motions of all the joints of the arm, not just the fingers.

Muscular Aggregation: Another Carlevaro term. This is essentially **passive flexion and extension** and **fijación** mentioned above. The difference in part is an implication that one has some awareness of how their chosen passive or active flexion and extension at each level (shoulder, elbow, forearm, wrist, fingers and thumb) are being utilized all together to execute a given technique and how the motion of each joint effects another down that chain (from the shoulder joint to the finger joint and thumb joints).

For example, deciding to pluck a string with the index finger by flexing or deviating the wrist, or by supinating or pronating the forearm, or by flexing and extending the elbow, or some combination of all of these things is an act of muscular aggregation. Feeling how much tension exists in your choice and choosing the one that executes the technique with the least tension is the ultimate goal.

Natural Alignment: Muscles function most efficiently when their lines of pull follow their natural alignment from origin (muscle) to insertion (tendon connection to bone). For example, if the wrist is flexed, the forearm flexors and extensor muscles and tendons are not aligned with the joints they pull in the fingers. This causes them to work harder (tension) and feel more fatigued (tension).

Midrange of Motion: Muscles work best when the joint they move does so within the mid-range of its motion capability (mid-range is defined as the middle two-fourths of the total range). This is the point in any technique in which the joints involved (and the muscles that move them) are not hyper-flexing or hyper-extending.

Follow Through: Muscles work best when there is enough follow-through in the movement they produce to avoid the build-up of opposing tension.

Economy of Motion: using the least amount of bodily motion (least amount joint motion, least amount of muscular contraction, or least amount of tension) to achieve techniques and musical expression on guitar. While tension often can be visually identified, **Economy of Motion** is primarily measured by the amount of muscular exertion (tension) perceived by the performer through their proprioceptive senses. Having said that, there are instances where certain techniques, fingerings, etc, are visually or audibly distinguishable as more or less efficient.

Static Stretching: pulls the muscles from the opposite direction of their function.

Dynamic Stretching: joints are moved through all their ranges of motion (flexion/extension, abduction/adduction, etc) with muscles pulling tendons/joints in alignment with their correct function. These types of exercises are great for warming up the body and as a routine to develop proprioceptive awareness.

The Spine and Hips

The Spine: flexes (leans forward, crunch), extends (leans back, tummy stretch), leans left or right, and rotates left or right around its axis.

Hips: flex (leg forward), extend (leg backward), abduct (out to the side), adduct (back to the middle).

Joints or movements relevant to guitar technique

Sterno-Clavicular Joint: Abduction, Adduction, Rotation Upwards, Rotation Downwards, Elevation.

These motions are created by muscles in the shoulders, chest, and upper back:

Shoulder Joint: Flexion/Extension (dumbell row, elbow forward/elbow back), Abduction/Adduction (elbow out. elbow in), Horizontal Flexion and Extension, Lateral and Medial Rotation.

These motions are created by muscles in the arm (biceps, triceps, etc):

The Elbow Joint: Flexion and Extension.

The Forearm: Pronation (palm down) and Supination (palm up).

These motions are created by muscles in the forearm:

The Wrist: Flexion and Extension (wrist down/up). Radial and Ulnar Deviation (wrist left/right).

The following joints are in the hand and fingers and are pulled by muscles in the forearm (extrinsic muscles) and muscles in the hand (intrinsic muscles):

Carpal-metacarpal Joint (Wrist Joint): Joint between wrist and hand. The thumb's Carpal-metacarpal joint is the primary mover of the thumb.

Phalange (Fingers): Anatomical term for Phalanx, or a bone of the finger or toe. These are separated by the interphalangeal joints in the fingers and thumb. In the fingers, the first bone is between the knuckle joint and middle joint, the second between the middle joint and distal joint, and the third between the distal joint and the finger tip. In the thumb, these bones are between the knuckle joint and the distal joint and between the distal joint and finger tip..

Metacarpophalangeal Joint (Knuckles): Joint between hand and fingers. These can Flex and Extend or Abduct and Adduct (middle finger knuckle joint can't Abduct or Adduct). Thumb only has one of these.

-Interphalangeal Joints (Finger Joints): Joints between phalangeal segments. Fingers have 2, thumb has one. These joints Flex or Extend. These are called medial (middle) and distal in fingers. The thumb's is called the distal joint. We refer to the middle finger joint as finger joint 1 and the distal joint as finger joint 2.

The Thumb: The thumb can move several ways: Abduction, Adduction, Flexion, Extension, and Opposition. Hyponychium is the distal border of the flesh underneath the nail plate. The folds of skin on the side of the nail are the Paronychium. Wrist stroke is easier when the nail does not extend straight beyond the paronychium.

Common methods for learning how to utilize the body effectively in musical performance:

Alexander Technique: Emphasis on the correction of erroneous postural and motor habits through increased awareness and the application of simple movement patterns designed to develop more control in our physical activities. It underlines the importance of spinal alignment

from the neck down, and, in general, well balanced postural stances when standing, sitting, or in motion.

Feldenkrais Method: Emphasizes understanding and improving or eliminating movement patterns that may be interfering with other motor activities.

Body Mapping: Basic understanding of anatomy and physiology with emphasis on how the joints move in order to better execute instrumental techniques. Emphasizes having a mental map of joints and understanding how they move the limbs.

Types of Levers

First Class: see-saw

Second Class: push up, wheel barrow

Third Class: draw bridge, shovel

Technique Vocabulary for MUS 118

The Body

Relaxed Spine and Spine Movements: When the spine is neither flexed/extended, leaning left or right, or rotated left or right. The spine can and should move a bit while playing so that the work of holding the spine is shifted between the various core and back muscles involved in keeping the spine relaxed. Bring the guitar to the relaxed spine/body, not the spine/body to the guitar.

Sitting Positions

-Folk Position

-Flamenco Position (cross legged and old style)

-Paul Galbraith Position (cello position). Allows left arm to shift primarily with flexion/extension, and right arm to string cross primarily using horizontal flexion/extension. This reduces the amount of abduction/adduction and rotation needed in both shoulder joints to execute guitar techniques.

-Supports: pillows, tables, other supports

-Foot stool: Causes spine/hip motion that brings the torso back and to the right. Without correction the spine flexes and rotates to the left or the right thigh is abducted to counteract the raised left leg. The height of the stool should be such that it brings the rim of the guitar to about the mid-point of the sternum.

Poised Arm (Both Arms and Spine): This describes an arm that is ready to act, but has the least amount (or zero) tension. It is impossible to have absolutely no tension at all times. Poise is the minimal amount of muscular tension needed for readiness. The

poised spine is the same, but also implies a bit of motion. This eliminates muscle contraction from holding the spine in place, passing the tension around the muscles of the torso. We can think of pose as the mid-point between total relaxation and maximum tension. Our goal is to have relaxed hands and wrists and forearms with poised elbow and shoulder joints.

Angle of the Guitar Neck: As the angle of the neck increases (the neck becomes more elevated, with the head of the guitar moving more towards eye level), less abduction/adduction is necessary to hold the guitar and you can rely on the stronger muscles of that flex and extend the shoulder joint for left hand motions. The right hand contact point also becomes more short arm, allowing the right hand to shift using horizontal flexion and extension of the shoulder thus utilizing a similar action and stronger muscles.

Slant of fingerboard: Finger board/guitar body should be slightly slanted back so that gravity helps you push the strings down and to aid the right hand in getting over the rim of the guitar. THIS SHOULD BE VERY SLIGHT. Many beginners tip the guitar body/neck too far backwards in an effort to see what their left hand is doing which creates problems in overall posture and ease of execution.

How the guitar can be moved in relation to the body

The position of the guitar in relation to the relaxed torso effects the ability of the the right arm to get over the rim of the guitar and the ability of the left hand/arm to execute techniques.

- 1) The head/neck of the guitar can move away from the body or towards it.
- 2) The bottom of the guitar (opposite side of the head) can move towards or away from the body (this the same thing as 1, only from the view point of the body of the guitar).
- 3) The body of the guitar can be tilted either forward or backward so that the back of the guitar is more or less flat against the stomach.
- 4) Raising or lowering the guitar head/neck. Starting with the neck and guitar body perpendicular to the body, you can raise or lower it so that the neck is closer or further from your left leg.
- 5) Moving the entire guitar left or right in relation to the body, adjusting nothing else.
- 6) Moving the guitar up or down in relation to the body, adjusting nothing else.

All of these motions effect the ease of playing. Usually most combinations of these positions are not inherently bad or good, they are usually a tradeoff. For example, when the head of the guitar is moved forward, away from the body, the right forearm is more naturally positioned further

over the body creating a long arm approach. On the other if the guitar head is not moved so far forward, the right forearm is more naturally in short arm position.

Generally, these motions in combination or individually effect how much abduction and adduction is required in both arms (particularly the left arm) and whether the right arm is in long arm or short arm technique.

Right forearm contact points with guitar: Long Arm is where 3/4 or more of the forearm is beyond the rim of the guitar. **Short arm** is when the 2/3 to 1/2 of the forearm in front of the rim of the guitar, creating a see-saw like lever. The elbow should not be beyond the rim. If the contact point is too long arm (or the elbow is beyond the rim), it will be difficult to get in Anatomical Position with the thumb in front of the index finger.

3(4) Displacement Types (moving the right hand/string crossing):

- 1) Elbow flexion/extension.
- 2) Shoulder rotation with abduction/adduction + wrist flexion/extension, creating a lever system with the fulcrum being the point where the right forearm comes into contact with the guitar.
- 3) Forearm horizontal flexion and extension. This is the only one where the contact point shifts significantly. The right hand moves almost perpendicular to the strings without wrist flexion/extension or deviation. The elbow and forearm move passively in response to the shoulder.
- 4) Combinations of these motions.

Setting the wrist (relaxed/neutral wrist): bring the wrist into relaxed (no passive or active flexion, extension, or deviation). This can be experienced by holding the hand in front of you so that it is palm down and passively flexed and then rotating the forearm until you feel a sensation in the wrist when it goes into the relaxed position. When actually playing the guitar, this is not achieved with forearm rotation. Instead, this is achieved by finding the proper spine alignment, bringing the guitar to the body, finding the right forearm contact point, and then using the shoulder to bring the right hand to the strings. The wrist is correctly aligned when you feel it “set” to its neutral position from the motions of the shoulder.

Setting the forearm: similar to the wrist, the forearm can also be “set” into its neutral position by the shoulder.

Passive movement of the elbow, forearm, and wrist are driven by the shoulder. In many cases the elbow, forearm, and wrist move but their muscles are not acting, they are just responding to shoulder motions. The reason this occurs is because gravity is acting on the joints as an external force that causes them to flex/extent/rotate/deviate without their corresponding muscles exerting any effort. While little or no effort is being exerted,

some tension may be caused by slight muscular effort, stretching, or simply the bringing of the joint out of neutral/relaxed position/alignment (even if no wrist or finger muscles are engaged, if the shoulder motion brings the wrist out of neutral position tension in the fingers and wrist can result because tendons are brought out of alignment).

Bigger Joint/Muscle Principle: Try to achieve any action utilizing the larger joints and stronger muscles before utilizing the smaller joints and muscles of the fingers and wrist. In the right hand this means using the shoulder to move the hand for string crossings. In the left hand this means using abduction/adduction to aid the fingers in intrapositional shifts and shoulder flexion/extension for interpositional shifts.

Effectiveness: How the executed technique sounds musically.

Efficiency: Measured by how much tension is experienced.

Right Hand

Basic Rosgados: Strumming: p i, and p ima. Driven by forearm rotation.

Anatomical Position (AP)(s): Thumb on G string, index on B string, middle and ring finger on high E string. Anatomical position is about the arrangement of the fingers, not the strings they are placed on. This arrangement could be done on the D G and B string. AP has 6 positions determined by where the thumb is placed with the high B string being the 2nd position and the low E string being sixth position.

Note that AP changes between rest stroke and free. In rest stroke, a and m are not planted on the higher strings and the thumb location still determines the position number, but now the thumb is going to be several more strings behind the string being plucked by the fingers (often it stays on the low E or A string). Also, in free stroke the first joint (medial joint) of i and m is below the string being plucked, whereas in rest stroke it is above the string being plucked.

Arpeggio Position(s): Starting in AP and shifting the middle finger to the B string, index to the G string, thumb to the D string. There are again 6 positions (only 3 of them are actually practical) all determined by which string the thumb is placed on, with low E being 6th position and high E being first position.

Pulgar (thumb) rest and free stroke and scales: Use wrist (carpometacarpal joint) to execute thumb strokes. Use of forearm rotation and elbow flexion to aid thumb strokes in arpeggios and scales for greater speed and volume. To do the limb supported strokes effectively, the right forearm must shift to long arm position to facilitate the elbow driven stroke (this makes thumb more parallel to strings). Circumduction (rotation motion of the thumb's wrist joint) is used for free stroke. When doing isolated thumb work on the bass

strings such as scales where no finger is involved, the middle finger or all three fingers in arpeggios position may be used as anchor fingers.

Right hand finger symbols:

p: thumb
i: Index
m: middle
a: ring
c: pinky

Right Hand Groups (p, i, mac): These three groups can move independently of one another. What is more important about this grouping is to note that movement in any individual finger in mac causes sympathetic tension in the other fingers of the group. Often it is useful to flex/extend mac as one single unit to avoid unnecessary tension caused by holding fingers that are not being used. Your goal is to alternate between groups, not within (pi, im, ia, etc).

Main right hand finger combinations: pami (pi, im, ia and ami, ima).

Anchor Fingers: In both hands they help you travel vertically up the strings. In the right hand you place your thumb and/or ring finger on the strings. In some instances it is acceptable to place the pinky or ring finger on the top of the guitar, usually when finger work is limited to pim. Free stroke scales use both planting of p individually and p+a.

Rest stroke scales only uses P. In free stroke the thumb follows mi on the next lower string below the string being plucked as i and m ascend strings. In rest stroke the thumb either stays planted on the low E or A string or it moves along with im but two or three strings back. You can also rest the bottom side of the thumb (palm down portion) against the string when doing free and rest stroke scales in some limited instances where you can't place the thumb anywhere consistently.

The fleshy part below the pinky (hypothenar eminence) or the pinky side of the wrist may be placed on the strings when plucking the string with a pick.

Guide Fingers: In both hands they help you travel on the strings/neck horizontally. Again this is typically p or a in the right hand. This is usually done to change tone color by placing the right hand fingers over the sound hole or closer to the bridge.

Constant Contact: using right hand guide and anchor fingers to always remain in contact with the strings/guitar.

Touch, Push, Pull, Release, Relax: **Touch** the string with knuckle flexion and finger joint extension, **Push** the string with the same knuckle joint flexion and finger joint extension, **Pull** the string to the adjacent lower pitched string by flexing joint of the finger, **Release** the string by continuing the flexion of the fingers first joint, **Relax** the knuckle and finger joints after the stroke is completed.

Rest Stroke (apoyando or push stroke): After the release of the string being plucked the finger tip comes into contact with the lower adjacent string. Push with the finger that is resting on the lower adjacent string to aid the plucking finger in an ascending string crossings. Use the shoulder to pull the finger during descending strings crossings to bring the plucking finger to the lower string. The first joint of the finger must be above the string being plucked.

Free Stroke (tirando or pull stroke): Finger does not come into contact with the next adjacent string. Angle must be oblique to the string to avoid hitting the next string. Play off left side of finger tip/nail. The first joint of the finger must be below the string being plucked. Playing off the left side of finger tip/nail and finger angle are determined by shoulder horizontal flexion and extension (essentially the fingers are positioned by the shoulder). This gets the proper angle of attack without tension from forearm rotation.

Playing from the string (touch pressure release): a phrase describing contact with the string before displacing it. A less complete version of Touch, Pressure, Pull, Release, Relax.

Preparation: The action of preparing a finger to pluck a string. This can be done either through contact with the string or by closely hovering over it. Be aware that the act of relaxing the fingers and other joints often creates preparation because the point of relaxation is the beginning of any technique. Relaxation must be considered a part of preparation.

Planting: placing the right hand finger tips on the strings they are to play before they are going to be used. Planting is one form of preparation. Guide and Anchor fingers are also examples of planting, although in this case the goal is both preparation and the release of muscular activity, because planting the anchor finger in the right hand relieves the right arm from holding the hand up.

Hovering: preparation that does not involve contact with the strings.

Placing: When the finger(s) are placed but muscular activity to hold or stabilize the hands are not released in the forearm and arm.

Sequential Planting: Used in right hand arpeggio technique: when one finger is planted, then that same finger plucks the string, and as that finger plucks the next finger is planted on the next string to be plucked.

Sequential Group Planting: same as sequential planting, but now this occurs between the three groups of the right (p, i, mac)

Full Plant: Usually used in ascending arpeggios. This is when all fingers are planted in preparation for what is to be played.

Plucking Chords: (Opening The Jar (radial wrist deviation), Elbow flexion). pim and pima. A time of limb supported stroke for plucking multiple strings for chords.

Arpeggios: 4 and three finger. Use of forearm rotation to aid planting. Forearm rotation is sometimes an active part of the process, meaning that the forearm is consciously rotated to aid the thumb and fingers. In other instances, the forearm simply remains relaxed and moves passively as a result of the activities of the fingers. In effect, the forearm in this second case becomes a shock absorber, preventing tension from building up in the forearm as result of trying to hold it place by moving with the fingers pluck when they pluck.

Left Hand

Shoulder abduction/adduction (elbow in, elbow out): Used to aid left hand finger placement. Old technique methods advocate for the elbow/arm to always remain close to the body, but this limits the amount of motion capable by the whole shoulder, forcing weaker muscles of the shoulder rotators and weaker muscles of the forearm rotators to exert more in order to place the fingers on the neck and shift from one position to another.

Shoulder Extension (dumbbell row): to aid fingers in pushing the strings into the soundboard. 70/30 split between shoulder extension and finger flexion to press strings into fingerboard.

Placement on Fingertips: left hand fingers should be placed on finger tips.

Weight Release: The amount of exertion required to depress the string into the soundboard is less than the amount required to maintain that depression.

Thumb: Thumb should not squeeze 95% of the time. Any flexion of the thumb joints that creates creases in the palm of the hand or noticeable movement in the thinner eminence should be eliminated whenever possible.

Forearm Relaxed: unless you are trying to depress a string with the pinky or execute a slur, the forearm should not be supinated (palm up). It is commonly said that the forearm should be maintain a supinated (palm up) position so the fingers have a uniform (perpendicular) angel of attack. This creates static tension in the forearm as one holds it in a supinated (palm up) position that impedes left hand finger action. When the forearm/arm is relaxed, the finger knuckle joints will be slightly diagonal to the strings, with the pointer finger knuckle being closest to the fretboard and the pinky knuckle being furthest.

Positions: in the left hand, these are any 4 finger/fret span. The position is determined by what fret the 1st finger is on and there are as many positions as there are frets. A scale or pattern that is positional does not require the left hand to shift, it all falls within one four finger/fret span. Each finger is assigned to each fret in the position. So in 5th position, 1st finger plays the 5th fret, 2nd finger plays the 6th fret, 3rd finger plays the 7th fret, 4th finger plays the 8th fret.

Left hand finger patterns: 1234, and 124 (1 2 and 4 can stretch the most. It is difficult to spread finger 3 from either finger 2 or 4. If you wanted to make a 5 or 6 fret stretch it is best to use fingers 1 and 4.

Interpositional Shifts: When the hand moves from one fret position to another, parallel to the strings

Intrapositional Shifts: when the hand changes attitudes within a given fret position, transversally across the strings

Compound Shift: where both types are present.

Constant Contact: the use of anchor and guide fingers to remain constantly in contact with the neck. This is used in scales in the left hand in multiple contexts. First, when ascending a string in a scale, such as a G type major scale, when finger 3 is placed after finger one, finger one releases its contraction and is pushed up by the string so that it is no longer pressing the string down but still in contact with the instrument (the string). This prevents an opposing motion that would occur if finger one were lifted off the string while also allowing finger 1 to relax.

Second, As one continues in the scale crossing from the G string to the B string, finger 3 does not lift off the string until finger one has come into contact with and depressed the B string. This ensures that even during a string crossing, the left hand is always in contact with the guitar.

Left Hand Neck Contact: The radial side of the pointer finger or the fleshy part on the palm beneath the index should usually be in contact with the neck. This acts as another point of stability. The guitar neck should essentially fall in between the horse shoe of the index finger and thumb. The thumb should not be kept in the center of the back of the neck as older methods propose. This middle of the neck positioning of the thumb forces the wrist to flex and fingers to extend more to reach the bass strings, creating unnecessary tension.

Anchor Fingers: In both hands, anchor finger help you travel vertically. In the left hand, an anchor finger is any finger that you keep placed on the neck/fret or strings/frets as you move the other fingers within a position.

Guide Fingers: Help you travel horizontally from bridge to nut in both hands. In the right hand these are again p and a (thumb and ring). In the left hand these can be any of the fingers that stay in contact with the fret board or string while shifting.

Bar Chord: first finger is placed on a single fret on 2 or more strings, essentially acting as a capo. This also utilizes shoulder extension to aid fingers in pushing the strings into the soundboard (dumbbell row). 70/30 split between shoulder extension and finger flexion to press strings into fingerboard.

-Full Barre: All six strings are barred

-Partial Barre: Only a portion of the strings (1/2, 2/3, etc) are barred

-Hinge Barre: When the first finger is extended but only depresses the high E string. usually used to prepare the hand for another type of full or partial barre to follow.

-Arche Barre: when the 1st finger depresses a single note on the low A or E strings and a note on the high E string but none of the other strings in between. A perfect use case for this is the A type major barre chord. By not pressing down the strings in between the bass and high E string the index finger exerts less to hold the chord shape.

-Barre with other fingers: uses fingers 2, 3, or 4.

-Cross Fret Barre: when the index finger is aligned so that it barres two different frets (like the tip of the finger is on the third fret and the base of the finger (near the knuckle) is on the 2nd fret).

-Inner String Barre: when the finger only barres inner strings but not the high or low e strings. An example of this is the flamenco version of the open A major chord where the index barres the second fret of the D and G strings, the middle finger is placed on the second fret of the B string, and the low A and high E strings remain open.

Slurs:

- 1) Hammer ons: left hand finger “smacks” into the soundboard without a corresponding pluck in the right hand.
- 2) Pull Off: left hand finger pulls the string, like a left hand rest stroke, then releases the string without a corresponding pluck.
- 3) Both slurs are aided by forearm rotation.

Vibrato

- 1) String bending (vertical vibrato, elbow flexion/extension)
- 2) Horizontal vibrato (shoulder rotation)

Types of Passive Flexion/Extension

The Shoulder Joint

Shoulder Flexion-Elbow Extension-Forearm Pronation-Wrist Flexion-Thumb Extension and Abduction with no opposition-fingers more perpendicular to strings.

Shoulder Extension-Elbow Flexion-Forearm Supination-Wrist Extension-Thumb Flexion and Adduction with more Opposition-Wrist extended or neutral-Fingers more oblique to strings.

Shoulder-Abduction-Forearm Pronation

Shoulder Adduction-Forearm Supination

Outward Rotation- Forearm Supination

Inward Supination- Forearm Pronation

Horizontal Flexion/Extension: minimal motion of other joints, used mainly for changes in tone color, causing slight Ulnar Wrist Deviation

The Elbow Joint

Flexion-Wrist Ulnar Deviation-Fingers less perpendicular to strings

Extension-Wrist Neutral or slight Ulnar Deviation-Fingers More Perpendicular to string

The Wrist Forearm

Pronation- Thumb Extension with Palmer Adduction and no Opposition-Fingers more perpendicular to strings.

Supination-Thumb Flexion with Palmer Adduction and Opposition-Fingers more oblique to strings.

The Wrist

Deviation creates minor tension in thumb and fingers

Flexion-Thumb Extension and Abduction-Finger Extension (particularly at knuckle joint)

Extension-Thumb Neutral or slight Flexion with Adduction-Fingers are neutral or slightly flexed.