

# **PRINCIPLES OF EFFICIENT ERGONOMICS AND KINETICS IN CELLO PLAYING**

Instrumental playing is based on multiple sensations. It is possible for the teacher to articulate the verbal explanations of these sensations in great detail numerous times, but the student must ultimately experience the multiple simultaneous sensations for himself. Notes must be executed digitally-evenly before one begins to emphasize them for musical interpretation. One must create a sense of mechanical coordination in the note learning phase before any liberties are taken. Therefore, digital learning precedes musical learning. All aspects of instrumental playing should be ultimately motivated by musical intentions, but the process by which this is accomplished needs to be technical and analytical for the non-prodigy.

I offer ideas and solutions designed for beginning, intermediate and advanced pre-college students that offer the most efficient ergonomic and kinetic solutions to many of the basic physiological complexities of left and right hand positioning of cello playing. All of the concepts of finger, wrist, elbow and shoulder joint relaxation or tension release as well as circular movements are applicable to all instruments, merely at different angles. While there are no specific exercises for tension release, I will often take a dull pencil tip and draw an imaginary line against the muscles that should be doing a specific task so that they will have a more tactile understanding of what they should be doing.

Setting the hands correctly in the early stages is of the utmost importance. When a prospective student's "cello parent" interviews with me, I counsel them about ergonomically efficient hand posture and kinetics. I educate them that taking extra time in the first few months of instruction to set a basic mechanical foundation will help a student move exponentially forward as he or she excels through various levels of repertoire.

The level of innate fine motor coordination can vary greatly in each child and each child has a distinct physiological make up in hand structure. More specifically, some have longer or shorter bones, some have "double", and some may just have 10 thumbs and it's our jobs to help them organize their coordination so that they can play their instrument. As I'm sure most of us have students with some form of ADD or ADHD, we are aware that the children have an extra level of challenges beyond the norm. This exacerbates the issues of LOW affect fingers that maneuver like wet noodles or highly tense fingers that never seem to want to be loose and supple. Our task as teachers is to be able to explain and or illustrate in as many different ways as possible, the basic technical principles and posture issues, as they apply to each set of hands we teach.

### **THREE IMPORTANT POINTS FOR ANALYTICAL LEARNING:**

1. Eye hand coordination
2. The release of excess body-shoulder-arm-hand-finger tension
3. Circular shoulder-arm-hand-finger posture and movement

The following concepts are applicable at any level of repertoire. The more consistently they are reinforced will directly influence how high and how quickly one's level will accelerate.

### **LEFT HAND POSTURE: VISUAL, PHYSICAL AND AURAL SENSATIONS**

#### **I. THE THREE MAPS OF THE FINGERBOARD**

I would like to stress that beginning students should ALWAYS be visually observing what they are doing when working on technique and posture.

##### **A. VISUAL MAP**

1. Tapes on the cello.
2. Connect eyes to the contact point of the fingertips on the fingerboard of the cello.
3. Finger placement should be done while the eyes glance to and from the music to the left hand
  - a. Use carefully "planned" movements.
  - b. Combine good posture with correct placement for intonation at the SAME time.

##### **B. PHYSICAL MAP**

1. SETTING THE FINGERS EFFICIENTLY
  - a. Curl the thumb and create a circle with the playing finger (practice doing this with a pencil or marker)
  - b. The circular tip to tip positioning (i.e. the coordination of the thumb and each of the playing fingers) acts as a fulcrum on the finger board. The hand can ideally pivot forward and backward as necessary.
  - c. Suspend the hand ABOVE the fingerboard.
  - d. Fingers should be arched above the cello and the last bone of the finger should be placed directly over the string on the fingerboard.
  - e. Have the tip of the finger press into the fingerboard, NOT the wrist, palm of the hand, forearm or elbow.
  - f. Fingers should be placed at a slight angle leaning backwards, on the inside corner of the finger.
  - g. When these points are accomplished, it allows the student to more easily facilitate quicker finger motion.

2. **FULCRUM**
  - a. Balance the weight of the hand into each of the playing fingers.
  - b. Practice rolling the fingers forward and backward before pressing.
  - c. Pivot the forearm from the elbow in an arc like motion. (pre-vibrato)
  
3. **WALKING FINGERS/LEGATO ARTICULATION**
  - a. WALK across the fingerboard.
  - b. Move from one finger to the next.
  - c. Keep the knuckles in the hand supple and loose.
  - d. Supple, gentle circular movement throughout the hand.
  - e. WATCH with his or her eyes the way the fingers need to.
  - f. Release the OLD note AFTER placing the next finger directly on the NEW note.

Students typically HOP across the cello, releasing one finger before the next finger has been aimed and placed onto the next note within a position. When attempting to create a legato sound, the actions in both hands need to happen without hesitation. Thus, legato motions require mechanical actions to have a smooth consecutive flow.

### **C. AURAL MAP**

1. **INTONATION**

When beginners first place their fingers successfully on the fingerboard, they subsequently hear the intonation about 95% correct or better, depending on where the fingers are placed with respect to the tapes.

  - a. Intonation will be off if the fingers are a fraction of a millimeter off, but approximate enough to be acceptable for a beginning level.
  - b. Over time, this can be fine tuned by testing octaves against open strings; A,D,G,C.
  - c. This sets an aural foundation for more complex interval testing for fine-tuning with double stops later on in development. Typically starting in Suzuki books 3-8 or equivalent.
  - d. Test for intonation against open string while learning all of the intervals.
    - i. M/m 2,3,6,7
    - ii. P4 4,5,8
  
2. **KEY SIGNATURES AND SCALES**
  - a. Major scales, 3 minor scales.
  - b. Circle of 5<sup>ths</sup> and 4<sup>ths</sup>

## II. BASIC LEFT HAND PROBLEMS AND SOLUTIONS

As teachers, we need to constantly iron out little technical fires that creep up as a student develops. What I stress is that playing the cello is NOT about pressing into the strings or bow as hard as possible so that we crack the neck and bow, it is how well we maximize the coordination of the least amount of muscle necessary to maneuver the bow into the strings or press the strings down to the fingerboard to accurately find the pitches with the left hand and create an beautiful clear tone with the right hand.

This is a persistent problem at all levels and is more noticeable with young children due to lack of fine motor skill coordination. The only way to fix this is to constantly reset the hand position for what seems like years until it is automatic and natural. The best place for the NON playing fingers is to be suspended over/on/or slightly next to the string being played on at any given time

### A. COMMON PROBLEMS

1. Retaining tension in the non playing fingers
  - a. Hyper-flexing the fingers, thus straightening them out
  - b. Over curling them underneath the hand.
  - c. Excessive pressing, squeezing, pinching of the non-playing fingers into the playing finger.

Students often force the 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> fingers into the 1<sup>st</sup> finger to press it into the fingerboard thus compressing them together. Alternatively, they will supinate the hand pressing the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> fingers into the 4<sup>th</sup>

2. Over-pressing down of the elbow, forearm and wrist
  - a. Wrist that is too concave or convex
  - b. Shoulder that is stiff and too high or low
  - c. Elbow glued to the side of the body

This mashing down of the hand and wrist to force the fingers into the string to make contact is most often due to the fact that MOST children's fine motor coordination ends at the wrist. Until one begins music lessons, a student has most likely not executed such difficult intricate tasks with the smallest of muscles and motions. When a child has to coordinate all of these digital posture issues at once, it is if they were asked to perform ballet and gymnastics with the fingers all at once. They are often confused by the multiple tasks and sensations needed and tense up in anticipation of the necessary movements.

3. Tendency to squeeze the thumbs into the cello or bow

This slows down, if not stops, the ability of the player to move VERTICALLY on the fingerboard. This is one of the most frequent habits of students at ALL levels

- a. Paralyzes the suppleness and flexibility of the hand.
- b. Prevents hands from pivoting forward/backward.
- c. Inhibits the ease of shifting the hand to and from positions.
- d. Jerky shifts.
- e. Uneven speed in shifting up and down the fingerboard.
- f. Causes an uneven pulsing of vibrato.

## **B. HELPFUL SOLUTIONS**

- 1. Release all of the tension and suspend/set hand over the cello
  - a. Gradually place barely enough pressure between the thumb and the playing finger, keeping the thumb curled, as to allow for supple movements in each of the knuckles in each of the fingers but still maintain secure control of the bow or cello with the finger tips.
- 2. Utensils
  - a. Corn pads on bow and neck help to identify correct thumb placement and allow a small hand to feel more secure on the back of the neck and the little corner of the bow where they need to be placed.
  - b. Using a pencil on the side of the neck helps a student navigate his thumb against a more obvious tactile surface.
  - c. Paper ball rolled up or toilet paper roll.
    - i. Either of these objects encourages the circular shape between the thumb and the rest of the hand.
  - d. Lift very light weights/food cans to develop the Deltoid, Rhomboid and Trapezius shoulder muscles used to lift the arms to a necessary height.

## **III. SHIFTING**

- A. Start students in thumb position and shifting exercises ASAP
  - 1. Eliminates “fear” of heights
  - 2. Begins the process of understanding beyond first position

Having to shift to and from a position early on teaches the arm joints NOT to lock up as well as acquaints a student ASAP with the concept of shifting.

- B. Shifting exercises
  - 1. Sirens from low b/e to any interval up the string
  - 2. Navigating the thumb through 3 different positions
    - 4 finger position
    - 3 finger position
    - Thumb Position

C. Anticipated Shift

1. Consists of three notes; old note, helping, new note
  - a. Old finger does the actual shift
    - Release pressure.
    - Move along the inside of the string.
    - Land on the helping note.
    - Immediately following this, the new finger should land on the new note.
    - Actual distance shifted is shorter than the interval heard.
    - The time needed to adequately execute the anticipated shift should be taken from the duration of the old note so that the new note will occur on the beat.
    - The old note should be divided in half, with the first half allotted to the old note and the second half to the helping note.
    - If there is a bow change for the new note, the shift will occur on the old bow and during the shift, almost all of the pressure should be released on the bow, causing the bow to barely draw tone.
    - The release of pressure occurs for a split second and must coincide exactly with the release of pressure in the left hand.

D. Delayed Shift

- The new finger does the shifting from the old note to the new note and is delayed until the new beat occurs.
- The shift is delayed until the articulation of the new bow direction and the pressure is maintained or slightly increased as to have the glide or slide be audible.
- The time used for the delayed shift is taken from the new note.

The student should begin to memorize the physical movements necessary to navigate the left hand efficiently up and down fingerboard. This process occurs gradually as a student progresses from beginner to intermediate and to advanced levels.

**IV. SETTING BASIC BOW ARM POSITION**

A. Suspend Arm

Use shoulder/deltoid muscles without raising the shoulder too much  
ROLL the shoulders and neck in a circular manner at rest AND while arms are raised

B. Pronate forearm

1. Allow for a pivoting back and forth from the elbow joint

- C. Let wrist dangle without tension or flexing
  - 1. Make sure the fingers aren't flexing and maneuvering BEFORE the bow is placed in the hand.
  - 2. Thumb and 2<sup>nd</sup> finger fulcrum
- D. Fingers on the bow
  - 1. Hook 1<sup>st</sup> finger
  - 2. Curl the pinky
    - a. The most dangerous finger- 4<sup>th</sup> finger
      - i. paralyzes the flexibility of the bow grip
- E. Releasing Tension on the Bow Arm
  - 1. 4 major areas on the bow arm where tension accrues.
    - a. Shoulder socket and chest
    - b. Elbow and forearm
    - c. Wrist and palm
    - d. Various joints within the fingers

Upon sustaining a basic legato bow stroke where all 4 parts of the arm work in smooth circular motion, the bow arm tends to have its basic motion set. Students often develop kinks or jerks in their bow arm technique as they try to coordinate a higher level of left hand technique while bowing. Thus, when a student approaches a new piece, the panic buttons in fine motor skills go on high alert and one needs to coordinate a higher level of tension free muscular coordination.

- F. BOW TECHNIQUE
  - 1. Long legato bow strokes and the beginning cellist
    - a. Bow technique page
    - b. Change in arm position at different points on the bow
  - 2. Bow circles at various points on the bow
    - a. Bow technique page
    - b. Different parts of the arm perform different circles
    - c. Isolate which muscle needs to do the work first.
  - 3. Staccato
  - 4. Spiccato (controlled/uncontrolled)

## V. SHOULDER TENSION

Back and shoulder tension are monumental problems for almost every instrument, all motions in the finger tips need to have corresponding shoulder motion that is loose and circular. It is important to open the shoulder socket while bowing as to free tension in the tone quality when bowing. Swing a child's arms side to side to create looseness BEFORE they begin to play

## VI. RELEASE OF BODY TENSION-HUMAN METRONOME

- A. Coordination of 2 legs and 2 arms while counting.

## **CLOSING COMENTS:**

### **TECHNICAL GOALS**

- \* Create stability and allow for maximum coordination with minimal muscular needs
- \* Produce uninterrupted lines with the bow and eliminate scratchy or abrupt bursts of sound
- \* Control abrupt, unintended dynamic changes due to change in bow speed or pressure
- \* Play with clear intonation and eliminate unmusical noises during the connection of 2 pitches

### **TEMPO CLARITY**

- \* Agogic vs. Rubato

Agogic Principle: Freedom within the measure

Rubato: Freedom within the phrase

Notes lengthened or shortened because of melodic, harmonic, rhythmic, or emotional significance must be balanced so as to preserve the structural unity of any phrases and movements.

### **THE BASIC LEGATO SOUND**

- \* Creating undisturbed sound that ascend or descend
- \* Rhythmic pulse that not affected by changing rhythms
- \* Dynamic contrasts based on musical content and not “impressive” percussive and or theatrical effects, intentional or unintentional