Honing physical organization as a path to refined musicianship[1]

Alan Fraser

The necessity of involving the physical

Musical performance involves all three aspects of a person: intellectual, emotional and physical. Once a basic technical facility is established, the physical is often relegated to the back burner in favor of musical values such as phrase, character, tone and articulation, emotion. Many highly trained musicians prefer to rely on their intuition to bring their musical ideas to fruition in sound – and yet the body is always there. Life without movement is unthinkable, and musical life depends on the performer's physical movement.

Performers are paying increasing attention to honing the physical these days, partly because there are so many injuries, and partly because we now know so much more about human movement: how it works and how it is learned. Modalities such as the Alexander Technique and the Feldenkrais Method bring a new dimension of perception, understanding and enhancement of movement to anyone, but for the performer there is special benefit. Not only one's general movement can be improved, but also specific aspects of one's musicianship: sonority, agility, phrasing and expression can blossom when the movement lesson is tailor-made to the demands of the musician.

Movement lessons specifically tailored to musical performance

A Feldenkrais or Alexander lesson may help one feel taller, move better, be pain-free – but when the teacher is also an *Embodied Performance Practitioner (EPP),* someone trained in both musical performance and a body & movement modality, more specific changes in one's technique, ones approach to performance can be evoked. An *EPP* sees performance problems from multiple angles and creates strategies specific to the musical tasks at hand.

[1] This is the text of Prof. Alan Fraser's lecture at the opening ceremony of SIMPOM (Brazilian Symposium of Graduate Students in Music) on November 3, 2020, video available at https://www.youtube.com/watch?v=tuRRRyAe_ho&list=PLnGXZrDS6z9jGdiNtPUDBiKJROQ_XBvWn&index=1&t=4656s. The symposium was held online by the Graduate Program in Music of UNIRIO (Federal University of Rio de Janeiro State) (all videos of SIMPOM's activities are at http://www.unirio.br/ppgm/simpom/2020).

The sophisticated workings of the human body

The human body is a sophisticated balancing machine. Only humans walk on two legs; all the other animals on four (birds walk on two but their main means of locomotion is their wings). Animals possess a horizontal spine, giving them more flexibility, allowing them to turn more quickly than an invertebrate to face an attacker – but only humans have a vertical spine. It is much more difficult to balance each vertebra on the one beneath is, balancing the head on top of it all, and balance the spine itself on the pelvis, which is balanced on the two legs! The whole thing is highly complex and incredibly unstable –but highly useful. The state of *unstable equilibrium* allows humans to "turn on a dime," to face an attacker even more quickly than a horizontal animal, and to do a host of other movements quickly, easily, and elegantly. The human skeleton is the highest expression of the wisdom of living mechanics that we know. How does it work?

The core must not be preoccupied with holding

In general, muscles close to the core provide the power for a movement; those nearer the periphery provide precision. If the core muscles are preoccupied holding the body upright, their capacity to power a movement is weakened, and physical ability reduced. This is why it is so important that even in sitting at an instrument, the body is freely balanced rather than held. Unfortunately, the musician's nervous system often tries to provide a stable base for their precise finger movements, solidifying the torso, reducing the moving power of the core muscles, inhibiting ability and even leading to injury.

As in standing, so in sitting

The parental injunction, "Sit up straight," or the command in Aikido sitting, "Shoulders back, hips forward," force the torso to be held in position, initially helping it to be upright, but eventually hindering movement. Arnold Schultz, in *The Riddle of the Pianist's Finger* (SCHULTZ, 1936) even advises fixing the hip joints to provide a stable base for the moving fulcrums of fingers, hand and arm. This all goes against what we know about body mechanics today.

We do not sit well

This lack of ability to sit functionally is appallingly widespread. At a recent rehearsal of a world class orchestra I could see that *not one* of the string players was sitting well. They were all either perched on the edge of their chair, feet tucked under the chair and the waist thrust forward – effectively locking the body, or resting against the chair back, decoupling the complex musculature designed to maintain the body floating upright. Muscle tonus was too high in the first case, too low in the second case – in both instances preventing the torso from powering the movements of the arms and fingers with full, precise, control. This orchestra played extremely well, but at what cost – both physical and musical? The less efficient a movement, the more wear and tear on the joints and tissues. No wonder fully one third of string players play in pain. And although they played wonderfully, imagine how much more the music would whisper and soar, how much more heart the musicians would bring to the table if they were physically free.

> *Are you sitting back in your chair now? Are you slumped forward, neck collapsed to get your eyes closer to the screen?*

How can we improve your posture without you having to think about it – because you and I both know that you will forget about it two minutes after this is over. You have other things to think about, like playing Bach or Beethoven or Rachmaninoff. We need to offer your neuromotor system the sensory information it needs to recalibrate on its own.

Improve your sitting by enhancing sensation

> *Take a moment to come out to the edge of the chair. Feel your sitz bones, the ischium bones, pressing in to the chair. Do they press equally or does one bear more weight than the other? Paying attention to the one you think bears more weight, begin to rock slightly forward and back, so that the sitz bone rolls on the chair. This allows you to feel the sitz bone more three-dimensionally. Is it round like a billiard ball? Oblong like an egg? Is it smooth or does it have an edge? Draw a line on the chair with that sitz bone, not by sliding it but by rocking on it. Is the line straight? Does it curve? Does it go off on a diagonal?*
>
> *Did your head move forward and back with the pelvis as it rocked? What would you your spine have to do to keep your head in one place, balanced over the sitz bones no matter whether you were sitting behind them… on top of them… or in front of them? Your spine would have to flex and extend. Does it do so easily? Which vertebrae can you feel bending easily? Which are more reluctant to enter into the gentle flexion… and extension… of*

> *the spine? Can you feel your head going up… and down… now instead of forward and back? This movement helps you maintain balance instead of losing it by falling forward or leaning back – it's more functional. Your core muscles remain moveable, available to participate the movements of your arms, hands and fingers. When you lean forward or back, the core is obliged to stiffen, interfering with the free movement of the periphery.*
>
> *Compare this second way of rocking the pelvis to the first. What are the qualitative differences? How different does it feel to stay balanced continually in gravity instead of constantly losing your balance and regaining it?*
>
> *And now, take a break. Are you sitting differently? Do you feel more or less awake? What has changed in the physical sense of self?*

The brain manages movement outside our awareness

These changes take place because a large part of the brain, perhaps even most of it, manages movement *outside our awareness.* You did not tell yourself to feel different, to relax, but it happened as a result of two things: the movements you did and the awareness with which you did them. Here's a further demonstration of how the brain is exerting a constant influence on the state of the muscles completely outside our conscious control:

> *Put your right hand, palm up, under your right sitz bone. Sit on your hand. Rock forward and back. Notice how well you can sense the three-dimensional shape of your sitz bone now! Ask yourself the deeply philosophical question, "Is my sitz bone massaging my fingers, or are my fingers massaging my sitz bone?" Do anything you can to increase the three-dimensionality of the sitz bone in your awareness. Even rock sideways a little bit, or slide in this direction or that to feel the sitz bone in ever-increasing detail.*
>
> *Now take your hand away. What differences do you feel now between the left and right sitz bones?*

On the right side the muscles have relaxed so much it may seem that they have dissolved altogether. Many people report the disconcerting experience of the bone having such direct contact with the chair that it actually hurts! How did this happen?

All the time your hand senses the sitz bone, the motor cortex works hard to improve the process. The brain says, "Oh, she or he wants to feel the sitz bone, I can help with that," and reduces muscle tone to better fulfil the intention. Gravity helps as well, naturally encouraging the muscles to soften to improve sensation. Again, none of us said, "Relax, relax," to these muscles. The brain does it on its own.

While reading the next couple of paragraphs, please continue the differentiated rocking movements of the pelvis, paying attention to the other sitz bone.

The complexity of neuromotor organization

The brain is constantly acting in this way to manage movement, and the process is incredibly complex. Every muscle of the body is involved in every movement. If I wave my arm to the side, even my leg and torso muscles must subtly change their tonus to adapt to the shift in the center of gravity. There are around 200 muscles in the body, varying greatly in size – but if we take an average of even only 20,000 fibers per muscle, that already gives us over four million muscle fibers total – and there is a neuron in the brain for each and every one of them. Each individual fiber can only be totally contracted or totally relaxed. The strength of a muscular contraction is controlled by the number of fibers involved. Thus each and every neuronal connection fires or does not fire depending on the activity being performed.

The unique, complex pattern of neuronal activity that generates a specific movement cannot be developed each time one wants to do that movement – it's simply not feasible. The patterns are stored as templates, pre-programmed patterns in the motor cortex. This data base is immense – imagine how much brain power is needed to store tens of thousands of movement templates, each including specific firing patterns for over 4,000,000 neurons. Babies spend most of their time soft wiring these patterns, and the process continues, albeit more slowly, into adulthood. The more movement habits we possess, the less time we need to spend developing new ones.

Unfortunately, some of these habits do not serve us well – such as the musician's tendency to overextend or over-stabilize the torso. We need an interface with the nervous system that can help improve patterns that don't meet our movement needs… and this is exactly what you have been doing by exploring the movements of your sitz bones on the chair. Directing your awareness to specific physical sensations associated with the movement reactivates the sensory learning process that was richest in all of us in infanthood.

Make the brain more amenable to improving movement

The musician has no time to think of these things while playing – but the more we feed the brain with this sensory return to infanthood, the better it can manage, in the background, the immense complexities of musical movement. These few simple movements you did already trained the brain closer to a balanced sitting posture rather than a held stability – a new default. This is the general thrust of all Feldenkrais *Awareness Through Movement* lessons.

The movement exploration you just experienced comes from one such lesson, *The Three Cardinal Directions in Sitting*. Feldenkrais developed hundreds of these lessons to address every aspect of our movement functioning: breathing, posture, strength, differentiation, precision and yes, even emotion.

> *Take a moment now to sense the changes in your sitting. Are you more upright? Farther back in your chair or farther forward? Feeling lighter or heavier? Has your breathing changed? Based on these changes, how might you relate differently to your instrument?*

Feldenkrais strategies specific to instrumental performance

Feldenkrais developed lessons that address relatively general questions of human movement. It is up to us, the next generation of Feldenkrais practitioners to develop lessons specific to a discipline such as singing or playing an instrument. Let's explore some of the specific, simple movements I have developed to encourage a musician's brain to maintain access to a moving core as they focus on the complex movements of playing. Please stand.

A trumpeter with neck pain

A trumpeter comes to me complaining of neck pain. I ask him, without his instrument, to mimic bringing the trumpet to his lips.

> *Try to imitate him now: bring your hands straight up towards your lips as he did, and angle your head forward, shortening the neck and tightening the neck and shoulder muscles.*

This was the most direct way of bringing his instrument to his lips, but it also guaranteed his cutting off his core muscles from the periphery. I needed to reestablish relationship between his body and his hands. Try doing now what I had him do next:

> *Move your hands down, then away, then up, then back towards your body, and down again in a big circle. Keep making circles as expansive as possible, and after several circuits, without warning from the outer apex of the circle bring your hands near your mouth. Your arms are now in playing position with none of the associated muscle tensions. Notice how upright you are. Notice how expansive the arms are, how free from tension.*

The look of stupefaction on his face told the whole story – his neck pain was gone. Later, when he tried that simple strategy with his instrument, not only was his neck pain gone but his fingers were more agile and his tone had improved because his breathing was freer. What changes do you notice in yourself?

Restore their rightful function to the core muscles

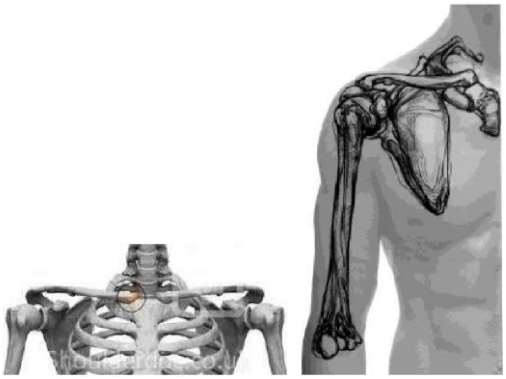
The brain learns quickly if you give it the chance. The large arm movements helped his core musculature engage in a moving pattern instead of a holding pattern, and the brain quickly adapted that new pattern to the actions of playing. It could adapt so quickly because the new movement was non-habitual – it was recorded on a relative *tabula rasa* in the motor cortex, where there were fewer parasitic contractions – contractions that are useless – associated with it. The brain was free to develop a cleaner, more effective way of moving with one's instrument.

The shoulder girdle-arms as a fixed frame

This illustrates a little recognized conundrum facing most instrumentalists: the frame formed by the shoulder girdle and arms as they hold the instrument (Figure 1). The central nervous system tends to fixate this frame, the better to control things, forcing the playing movements to work against the frame-holding muscular patterns – the parasitic contractions. The problem is solved by perceiving the frame as a moving entity, but this is easier said than done – unless you're a Feldenkrais practitioner. For someone who thinks about movement functionally, it's a simple thing to devise strategies that cultivate this perception.

> *Stand up again and pick up an imaginary violin and bow… and now do a peculiar thing: play the violin without moving the bow. Leave the bow arm stationary and instead, move the violin left and right. Sense what your left shoulder blade is doing. Does it slide on the ribs? Can you sense the static frame of the shoulder girdle unlocking, giving the brain a new movement image which can now inform the "template" of the normal bowing movements?*
>
> *Return to playing the violin normally. How much more free do you feel? How much more rich is your tone?*

Figure 1 – The sternoclavicular joint



Source: Fraser (2021)

Watch Itzak Perlman play. He does half and half, moving both the violin and the bow hand closer to and farther away from each other. I suspect that the limitation of his movement lower down (Perlman had polio which more or less paralyzed his legs) stimulated him intuitively to seek an improved movement organization higher up.

> *Or play an imaginary up bow with an arm movement so vigorous that the hand continues past the strings, up and around the top of a big circle, then around to the outside and down to hang by your side. Make the largest circle you can, with real élan. Do this in a large open space so you don't whack something (or somebody!) with your bow. Try this several times… and then reverse the direction of the circle. Play a down bow that continues down, out, around and up to the very top. Become the Pete Townshend of violinists.*

Again, these large arm movements transform habitual holding patterns in the core musculature into an *action*. The brain cannot maintain both simultaneously. By creating a default organization inclined to action, we help the brain then apply that organization to the movements of playing. When the core maintains moveability, the periphery gains in precision and agility.

The collarbone is proximal to the shoulder but a part of the arm

One more perceptual exercise:

> *Place your left hand on your right collarbone. Move your right arm as if you are playing your instrument. String players will move the bow, wind players will pick up the instrument, and pianists will move the hand along the keys. Even singers can make expressive gestures with the arm. Sense the movements of the collarbone.… Side to side.… Forward and back.… Up and down.… In circles along combinations of these planes… move the arm in any configuration that clarifies just how the collarbone participates. Continue as you read the next paragraph…*

The collarbone is a peculiar thing. We think that the arm ends at the shoulder, which would make the collarbone, proximal to the shoulder, a part of the body. But feel how it moves as the arm moves. In terms of skeletal structure, the arm ends at the origin of the collarbone in the sternum. Functionally speaking, the two arms attach to the body at points only a few centimeters apart! As you play, if you simply maintain a sensory awareness of your collarbone and its movements, your sound and agility – your whole sense of *relationship* to your instrument – should improve.

Enhance the sternum-sacrum relationship to activate the kinematic chain

> *To confirm your sense of relationship between the core and the periphery, put one hand on your sternum and the other on your sacrum. Rock forward and back on your sitz bones as before, keeping your head in the middle. Sense the transmission of movement through the links of the chain of your spine from top to bottom… bottom to top… Feel how the sacrum pushes the sternum up and forward as it rocks forward… how it pulls the sternum down and back as it rocks back… or feel how the sternum pushes the sacrum back as it sinks down… and pulls the sacrum forward as it rises up. It's like breathing – spinal in-breaths and out-breaths.*

As the pelvis rocks forward to lift the sternum, it also lifts the arms – which originate in the sternum. Are you beginning to see, and more importantly, to experience, how all the parts of you involved in playing are interrelated parts in a kinematic chain?

> *Sit again. How has your sitting changed now? Take a moment to imagine how all these movements might influence how your sitting supports the way you play your instrument.*

Strategies applied to artistry: the Rachmaninoff cello sonata

These strategies become even more effective when an artistic dimension is added. Let's watch as a cellist applies these ideas to the slow movement of the Rachmaninoff cello sonata. Watch how her relationship to her instrument and to the music changes as we work (https://app.pianotechnique.org/video/rachmaninoff-cello-sonata-2nd-mvt/387) (HAJI-DJURICH; FRASER). This cellist plays with wonderful expression, a real emotional élan and consummate technique – but she was (as almost all instrumentalists are) slightly overextended in her spine. She was "playing out" to the audience, but I felt that her interpretation could gain in emotional depth if she changed the direction of her intention – to dive into her inner emotional world and explore the riches therein instead of feeling the need to show it all to the audience. One detail gave me the clue to all this: her feet. She would go up onto her toes as she "efforted" her phrases. I knew the phrases would gain in profundity if they arose from a sense of rootedness in the ground. Thus it was that I could link a change in physical strategy to a change in her artistic intention.

Each artist has their own unique and sophisticated set of physical habits. It's their way of relating to what they do, their physical style. The EPP must be sensitive to this and never simply impose a standardized solution. As I worked with her I saw that we could take an indirect step towards balancing her exuberant extension with more flexion by exploring side bending. The movements of the bow naturally lend themselves to side bending, and when she discovered how to do *this* without losing her balance, suddenly it was easier for her to "retract," to have choice in the matter of internalizing or externalizing her expression.

After exploring variations on the sitting movements explored above, variations that specifically suited her movement style, she played again, and the change in the musical result was profound. When she found a more "inward-looking" posture that did not feel collapsed, the taste of the communication also became more intimate, closer to the mark heart-wise – more like a prayer. Here you can see how the physical strategies of the Feldenkrais mindset can be mapped on to the artist's individual, unique organization, so that the deepening musical expression is truly a more complete expression of self.

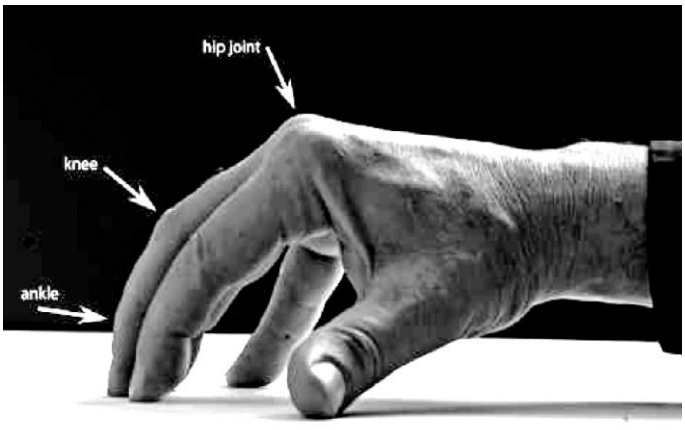
Sequencing the elements of the kinematic chain

This article first looked at the torso, then the shoulder girdle, and then the clavicle… we are proceeding gradually from the core to the periphery. Next are the differentiated movements of the arm, hand and fingers, where we'll deal specifically with piano technique – but these aspects of hand movement are relevant to all instrumentalists, so please read on…

At the piano, grasping is standing

We gain insight into the skeletal mechanics of the hand when we see it as a mini body, with an ankle (nail joint), knee (middle joint), hip joint (MCP joint), pelvis (hand), torso (forearm) and head (elbow) (Figure 2). All the laws of skeletal mechanics that apply to the whole body apply to this mini body as well – with virtually no modification – if we begin with grasping, the fundamental action of the human hand. Once the grasping action stands the hand upright on key, it can walk, run and jump to inflect a myriad of musical shapes and sounds. Let's refine standing with our whole body before bringing the same experience to our mini body.

Figure 2 – The hand's ankle, knee and hip



Source: Fraser (2021)

> *Sit out towards the edge of the chair, and lean forward without going into extension. Don't sit up. Instead, angle the head farther and farther forward… so the upper torso sinks lower and lower… until eventually the pelvis leaves the chair. Once the center of gravity has shifted from the sitz bones to the feet, it's an easy matter to straighten the*

> *legs and stand. This way of getting out of the chair is effortless, an ingenious use of skeletal mechanics to dialogue with gravity instead of fighting it.*
>
> *To sit down, don't sit down! Instead, simply bend the knees. Think that you are going into a squat. At a certain point, surprise! Your posterior kisses the seat. Now continue the process of transferring the weight back from the feet to the sitz bones and voila, there you are in your chair again. Repeat this many times. Especially practice the moment when the sitz bones leave the chair or meet the chair. Get to know your own skeletal mechanics. Get to know the strange feeling of getting out of a chair while harmonizing with gravity the whole time.*

Now let's get back to the hand.

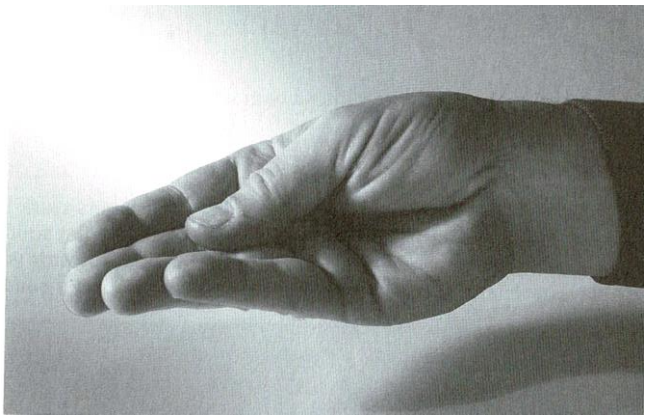
> *Grasp now, first as a baby does – curling the fingertips tightly into the palm and wrapping the thumb around them.*

Thumb opposition

Do you remember being astonished at a baby's strength in grasping? There is immense power in this elemental, almost primordial version of the action, but it's not so useful for playing an instrument. Total curling is all power, no differentiation – but one simple change in the mechanics of the hand can harness that power to the pianist's needs:

> *Straighten the fingers, straighten the thumb, and bring them together. Press the straight thumb against the underside of the flat fingers. Fingers and thumb are now in opposition (Figure 3).*

Figure 3 – The thumb and grasping: opposition



Source: Fraser (2012, p.36)

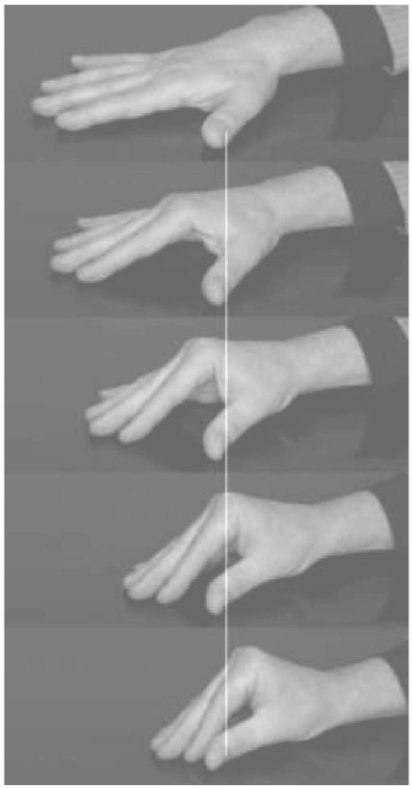
Thumb opposition is one of the principle movements that distinguishes us from the other primates. It allows our hands far greater dexterity, a far greater capacity to manipulate objects with precision and power – and it is the secret ingredient that allows the "hand mini body" to stand, walk, run and leap with greater alacrity at the piano.

> *Press the straight thumb against the underside of the straight fingers again. Feel the power of that grasping action. Flap them together quickly and repeatedly making a slapping noise. Congratulations, you just discovered the sound of one hand clapping!*

Grasping grows the arch

> *Now lay your hand palm down on a table top. Keeping thumb and fingers straight, begin to oppose the thumb – just the very first part of the movement. Watch what happens. As thumb approaches fingers, the middle of the hand begins to rise. Eventually it creates an arch structure, the keystone of which is the metacarpal-phalangeal joints (MCP joints). Touch the thumb to the side of the 2nd finger somewhere near its tip – the thumb is now the base of a triangle whose sides are formed by the fingers (the phalanges) and the hand (the metacarpal bones) (Figure 4).*

Figure 4 – Fingers approach the stationary thumb creating an arch with the metacarpal-phalangeal joints

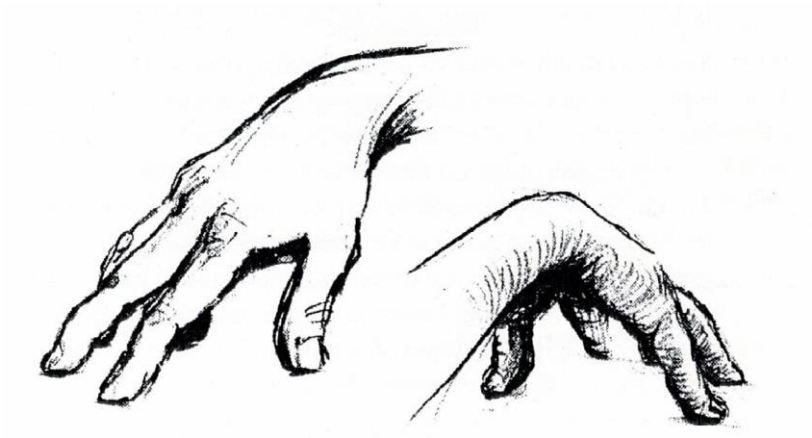


Source: FRASER (2021)

Standing the arch up

> *Keeping this triangle firm, move the wrist forward so that the heel of the hand leaves the table… The hand has stood up. The pelvis (hand) is now balanced on the legs (fingers), while the torso (forearm) floats above (behind). Sense the stability and potency of this standing state (Figure 5). Sense how the more the hand remains firm, the deeper let-go happens in the upper arm and shoulder area… After some time, let the wrist sink to the table top again as your hand mini body sits down.*

Figure 5 – Standing hand with a sitting body



Source: Fraser (2003, p. 59)

This introduction to the skeletal mechanics of the hand is an important initiation. Did you notice that we never mentioned the weight of the arm? Just as we don't think about our torso's weight when we get out of a chair, it's unnatural to think about the arm's weight when teaching the hand to stand. The weight is there, of course, but skeletal mechanics neutralizes that weight so it works for us, not against us. Consider the arm as possessing mass rather than weight. "Weight is a burden, mass is a tool" (JOHNSON)[2].

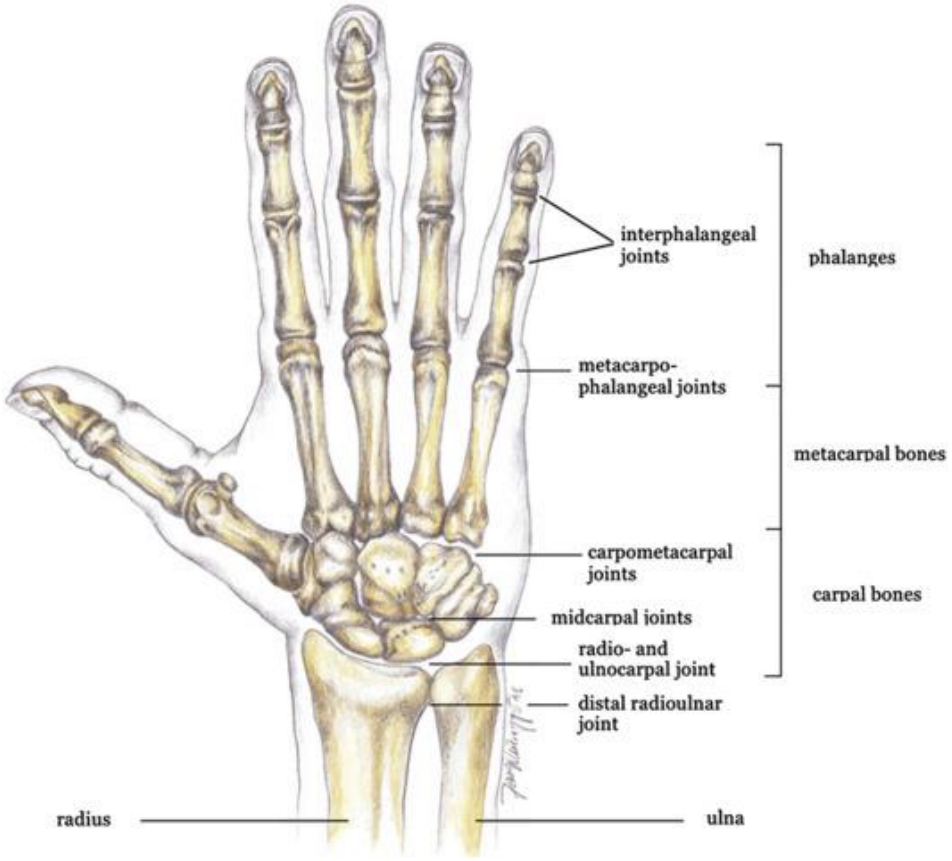
Os arcos da mão

The hand actually comprises multiple arch structures (Figures 7, 8, 9):

- the Russian, from fingertip to MCP joint to wrist
- the Transverse, from 5th MCP joint to 2nd MCP joint to thumb MCP joint
- the Roman, from thumb tip to thumb MCC joint to 2nd MCP joint to 2nd fingertip
- the Carpal, formed by the slight transverse curve of the eight wrist bones

[2] Information on Doug Johnson: www.dougjohsonpiano.com.

Figure 6 – The articulations of the hand



Source: Sendi *et al.* (2020)

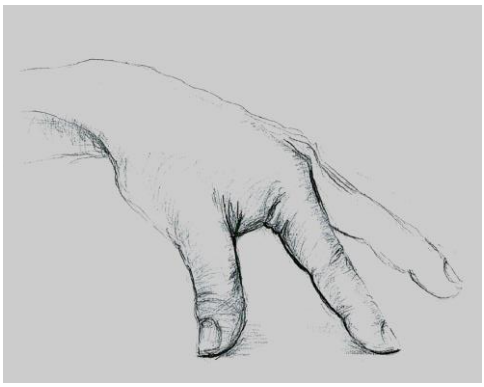
Figure 7 – The hand at rest, a line along the transverse arch

Source: Fraser (2010, p. 50)

Figure 8 – Gothic arches in the hand

Source: Fraser (2010, p. 51)

Figure 9 – The Roman arch



Source: Fraser (2010, p. 55)

The 2nd MCP joint is implicated in three of these four, so it, more than any other joint, can be considered the keystone of the hand's arch. The thumb is actually not even a part of the Russian arch. When it joins the game, it transforms the Russian arch into a Roman arch, one side of the Russian arch becoming the lintel of the Roman.

Even the harpsichord treaties mention the dome of the hand that must be maintained constantly in playing. The piano player's arch structure needs to be as powerful as the Gothic arches of a church, but it can't be as solid. It needs to *move* without compromising the structural-functional integrity of that dome. This is tricky, but it holds the key to virtuosic playing. To solve this thorny problem, let's first examine how the whole body does it.

Learn to walk without collapsing "the hand's hip joint" – Tai Chi

> *Stand once again, and explore the special type of walking found in Tai Chi, the ancient Chinese martial art. Bend the knees to sink your center, and reach out with one foot to touch the ground – but do not shift the weight. In Tai Chi, taking a step and shifting the*

weight are two different actions. Separating them adds a new dimension of ability to the movements of the Tai Chi form.

To make sure that you are not shifting the weight prematurely, touch the floor gently several times with the stepping foot. This is called the Tai Chi empty step. Dab the floor with the foot, tap it with the foot, but don't stand on the foot. Sense a clear difference in feeling between the tapping foot of the yin leg, and the standing leg, the yang leg.

Now walk normally. Has the empty step exercise changed the feel of habitual walking? Can you better feel the elegance with which your pelvis and hip joints transfer the torso's weight smoothly from one leg to the other? (Figure 10)

Figure 10 – O passo vazio do Tai Chi

Source: *Wikihow* (2020)

Let's first transfer the empty step practice to the hand, and later the feeling of walking smoothly, clarifying the functional differences between a *yin* and a *yang* finger on key before integrating that into a smooth melodic legato.

Stand the hand again on the straight 3rd finger. Angle the wrist a little to the side until the adjacent finger is close to the table – without collapsing the MCP joint at all. Wiggle the adjacent finger, tap the table top with it, still maintaining full structural integrity in the MCP joints. You'll notice it's not as easy as it sounds.

Leave this, hang your two hands by their sides. Feel the differences in sensation between right and left. Notice the benefits of using the hand's structural potential, how different it feels from just relaxing.

> *"Play the piano" as you normally would, on the table, or on your thigh if no table is handy. How does this movement compare to the structuralized walking of our exercise?*

Most pianists will let the MCP joint drop – sometimes a lot, sometimes hardly at all – but even a tiny collapse is enough to ruin one's sound and agility. That collapse constitutes a functional disconnect between the action of playing one note and the next. This functional disconnect is audible in the sound – it's the absence of legato, the absence of a singing line. For the notes to be joined in a smooth phrase shape, the physical action of playing the notes must be unbroken as well. There must be no interruptions, no physical anomalies in the action of transferring the weight from one note to the next. Sensing the weight on each note makes each note a unique musical event. The note may be nice and fat, juicy and beautiful, but to sing fully it needs to be joined seamlessly to its neighbour.

We were taught to collapse

Why would we indulge in this functional separation of one note from the next when we can see how much it harms the musical line? Because that's how we were taught. Using the weight of the arm, the relaxation techniques have been taught by piano teachers for over a century now. Arm weight technique was the best way the teachers of the time knew to address the worst aspects of the finger action school, where the fingers were moved in mechanical isolation instead of having their movements involved with the organic whole.

> *Stand your hand on table and lift one finger then another in a sort of goose-stepping technique, keeping the wrist fixed entirely – don't let it move at all. This feels horrible, right? Of course it does!*

But the solution is not to reduce finger flexion to virtually nothing and replace it with a weighted touch where the arm drops a more or less dead finger into the key.

> *Try that now: dangle the finger from a floating arm, then drop it to the table or even better onto a key, and use the weight of the arm to push the finger into the key, making the note sound. Notice how the MCP joint collapses under the pressure of the arm. Feel the oppressive sense of compression.*
>
> *Try playing like that again, but make your finger resist the collapse – when the arm impinges on it, fight back! Try to stand back up!*

This is marginally better. At least your finger has retained some of its capacity to move.

> *Now float the arm down, and as the hand approaches the key, use your biceps muscle to lift the forearm up towards your shoulder – bend the elbow. Paradoxically feel your arm simultaneously weighted and weightless. You are still aware that the arm has mass, but you are managing the free, agile movement of that mass in space by a judicious involvement of certain muscles.*
>
> *Now combine these. Float the forearm down until fingertip meets the key surface. Before the key even begins to move down, begin a standing action in the finger. By the time the note sounds, the MCP joint should already be as high as it can be, the standing finger rising to its full height, simultaneously weightless and carrying the weight. Now you are free to move to the next note where the same standing action will happen with no collapse of the MCP joint. It might swoop, but it never loses its capacity to stand well… it's exactly the same as getting out of a chair!*

Your hand has just passed from a primitive stage of human walking to a more sophisticated stage, where the weight does not encumber because you have controlled it by *neutralizing* it. One realizes just how ridiculous it is to "feel the arm's weight as you walk on key" when one tries to "feel the body's weight" as you walk down the street. Try that now.

Who would "feel their weight" in walking?

> *Stand up, and sensing just how heavy you are, let your body's weight slump on to the stepping foot. Walk like this, feeling your weight as much as you can. The result is a heavy, clunking gait that bears little resemblance to the sophisticated, smooth walking of healthy adults.*
>
> *Now walk normally. Feel how your torso glides between the two hip joints, now balanced on the right, now on the left, with no interruption whatsoever in its smooth gliding forward.*

The pelvis actually moves through a flattened-out, three-dimensional figure eight as you walk. Take a step, and as your weight shifts onto that leg, that hip will be farther forward, farther to the side, and higher than the other one. Take another step. The pelvis translates to the other side, and the other hip gets higher and more forward. These are the elements of the figure eight.

Rotation

We are beginning to get a feel for the complexity of the process. We need to add one more element to the hand's action on key for a full approximation of human walking by this mini body. Stand again on the straight 3rd finger, the other fingers bunched loosely against it, and notice that there are two ways to move its knuckle left and right. You can *translate* the knuckle sideways with a lateral movement of the forearm (notice that it's the forearm and *not* the elbow), or *rotate* the forearm along its own axis. A combination of these two will generally be happening in some small degree as the hand glides from note to note in melodic shaping. This is the hand's equivalent of that flattened-out figure eight motion of the pelvis.

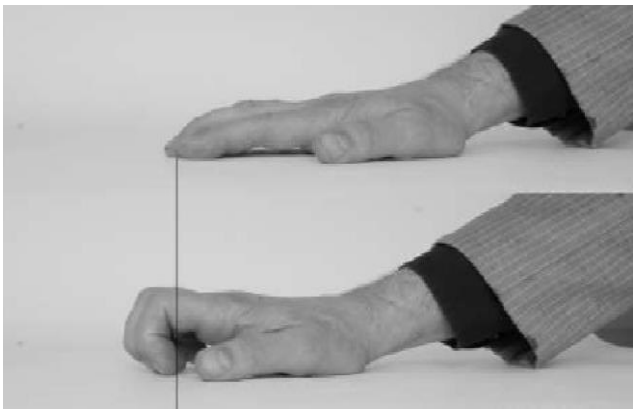
> *Play a melody using your habitual touch. Can you now detect if there is an ever-so slight collapse in the MCP joint as you move from note to note, or whether your hand's standing and walking action is developed enough, robust enough, to neutralize the collapse before it ever starts? What helps you better combat the collapse, a robust finger-standing action, a little judicious gliding wrist rotation, or a combination of both?*

Curving and curling the fingers without collapse

We learned the key elements of walking on key with straight fingers because we needed to highlight the key role of the MCP joints. The "hand's hip joints" must reign supreme for the hand to stay healthy – but many times the fingers must curl in piano playing. How to introduce that added movement without undermining the crucial, healthy functioning of the hand's hip joint?

> *Lay the hand palm down again, this time curling the fingertips under so the MCP joints stay low. Notice the sense of strain the collapsed arch evokes (Figure 11).*

Figure 11 – Curling the fingers under with low MCP joints



Source: Fraser (2021)

When I ask audiences to do the straight-fingered opposition movement, many of them curl the fingers unawares. Curling the fingers has been so ingrained into their hand's self-image. Without the structural-functional support of the MCP joint, the curling fingers must strain to move, and the forearm tendons as well. It would be like walking using only your feet and your lower legs, but not the thighs. This is the principle cause of tendonitis – exacerbated by a weighted touch.

> *First review getting out of a chair. Sit forward in your chair and try to get up without leaning the torso forward. It's a struggle, isn't it? Now lean forward… farther… and farther… until the pelvis leaves the chair. You made no effort to stand up, to get out of the chair, but now it's an easy matter to straighten the legs and stand fully upright. The structure did the work.*

Here's the equivalent for the hand when the fingers curl:

> *Lay your hand palm down on a table once again. Create a straight-fingered arch by drawing the fingers towards the heel, this time allowing the heel to leave the table. Continue the movement until the wrist moves forward over the hand, then curl the fingers until the tips touch the heel – you've done a full curl without undermining the hand's hip joint – the MCP joints are still the highest point of the hand because the fingers didn't curl prematurely.*

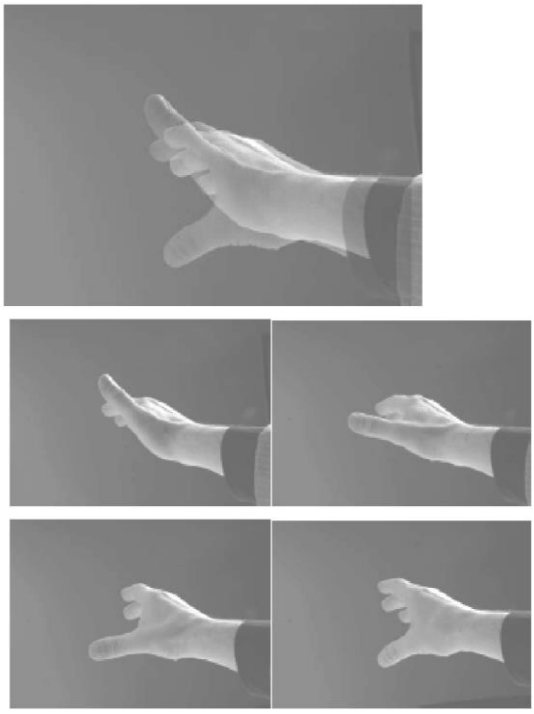
The common denominator between whole-body standing and the standing hand is well-aligned bones. Bones are hard. They transmit kinetic energy much better than muscles do – if they are well-aligned. Muscles create kinetic energy best when they are soft. If they are hard; if they are holding on to bones to keep them aligned, they cannot move, and

energy is blocked. The bones need to be *balanced* in alignment if the muscles are to be free to contract and release efficiently.

The thumb

One final problem before we have exhausted the scope of this introductory article: the thumb. How can the thumb move a key down if it is opposing the fingers, moving opposite to them? The opposing thumb moves through a huge arc, and the very beginning of that arc moves down as the fingers do (Figure 12).

Figure 12 – The downward segment of the thumb's opposition arc



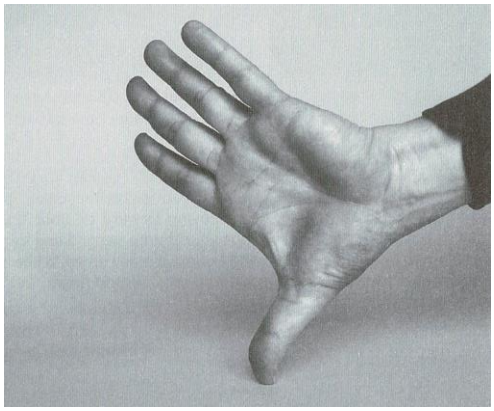
Source: Fraser (2021)

Thus it can be used to play the piano. We have already seen how the beginning of the thumb opposition movement is enough to bring the hand up into its arch structure, but there is much more to it than that.

> *Make a fist, stick the thumb straight out, turn the hand over and stand it on the straight thumb. Practice the Tai Chi empty step with each yin finger in turn, all the time standing securely on the yang thumb. Every time the finger touches down, sense an arch structure being created between thumb and finger, and the dose of thumb opposition that keeps it healthy.*

Now rotate on the thumb, keeping it secure and firm in its standing (Figure 13).

Figure 13 – Rotation on the thumb



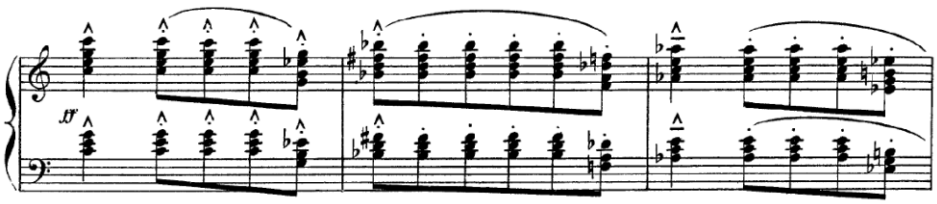
Source: Fraser (2012, p. 39)

This rotation brings the fingers to a higher or lower position in scales and arpeggios with no need to flop them, no need to collapse the thumb, no need to try to pass the fingers over, no need to pass the thumb under, no need to swivel the hand horizontally.

From theory to practice

How does this work in practice? The hand standing well increases both the amount of volume the piano can produce, and the variety of color. In this excerpt from Debussy's *Pour le piano* (Figure 14), the repeated chords sound clunky and ponderous when played with a weighted touch. With a judicious standing action, they begin to dance and glow with ecstatic color.

Figure 14 – DEBUSSY, C. Pour le piano / I. Prélude, c. 43-45



Sometimes Bach can feel tentative and disjointed, even though the pianist understands not only the music, but also the idea of standing and walking on key. Bringing the whole body into play can open up rhythmic élan and lend direction and shape to the phrasing.

Conclusion

This exploration of the physical component of musical expression is a never-ending voyage of discovery, a constant uncovering of new interpretive riches. The physical return to self is a means to the greater expression of the musical Self – the one that serves music, discovering a work by living with it, experiencing it, instead of manufacturing a pre-conceived interpretation. I hope this short introduction stimulates you to further strides on your own voyage of a combined physical and musical self-discovery.

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