

Marsyas bound: Neurological dysfunction and its impact on pianists, from a pedagogical perspective.
Rehabilitative work at the instrument with affected pianists.

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This is unfortunately a fairly dark topic, please understand that it's not my intention to frighten people into believing that a muscle twinge while playing is a symptom of a larger neurological disease. I feel it is extremely important though, to address an issue largely overlooked in the music medicine literature, namely how to handle musicians' injuries that are not caused by a dysfunctional technique or practicing habit.

As a performing or teaching pianist, how should one react, when pianistic injury and dysfunction is not caused by practice, but rather caused by or compounded by other health issues?

I approach this topic by way of a short introduction. I was active as a performer from 1995 until 2010, when I stopped playing professionally and began concentrating on neurological dysfunction and its effects on a pianist's ability to practice his or her art.



These two right hands shown in a similar position are from me and were taken within the time span of 8 years. In 2008 at the age of 35 I was diagnosed with an autoimmune disease after having had symptoms since childhood. The pianistic problems that arose from this included many common instrument-related injuries including median nerve entrapment syndrome (also known as carpal tunnel), tenosynovitis (more commonly called tendonitis), and focal dystonia. It was nearly always assumed by doctors and other practitioners that these ailments arose from misuse or overuse of the instrument. I was in contact, sometimes prolonged and repeated, with a variety of experts in the field of music medicine, including physiotherapists, osteopaths, neurologists, orthopedists, kinesiologists, nutritionists, practitioners of Alexander technique and Feldenkrais method, as well as pianists specialized

in injury rehabilitation and prevention. I also sought psychotherapeutic help to look into any possible psychosomatic causes for these mysterious afflictions.

The physical symptoms included pain in various fingers, weakness in the hand and fingers, and typical trigger point pain experiences (such as the “tennis-elbow”: lateral epicondyle). The problems were visible in a lack of structural integrity in various parts of my body, for example the right shoulder sagged visibly lower than the left, the hands had lost structure and appeared to be “wasting away” as you can see in the picture on the palm side, and it was impossible to maintain the structural bridge of knuckles visible on the back of the hand. Since the autoimmune disease was diagnosed and treated, most of the symptoms affecting my general health have subsided. The pianistic symptoms have proven to be the most difficult to resolve, perhaps leading to an indication of damage within the central nervous system, damage which is difficult, when not impossible, to recover from. Chronic pain is still present.

It’s generally thought that health problems account for only a fraction of all musicians’ injuries. I’d like to make the assertion that health issues can pose a much greater threat to our ability to practice our art.

There are problems with the existing epidemiological studies. Music medicine is a relatively new subject of study. Certain standards and diagnostic measures have been developed within the last decades such as how to precisely define “Playing-Related Musculoskeletal Disorders”, or how to make the musician population in the studies more homogenous in order to rule out possible distractor variables, but many of the existing studies suffer from a lack of consistency with each other. When it comes to Non-Playing Related Musculoskeletal Disorders, things get even more confusing. There is as far as I can see no epidemiological information regarding NPRMDs, probably because assessing all possible NPRMDs would lead to meta-analyses that are too heterogeneous, and therefore are difficult to study scientifically.

I will now focus on some movement disorders that arise from a neurological illness or dysfunction. Other aspects of pianism might be affected as well such as cognitive ability,

memory or psychological health, but I'll stay focused on movement disorders to avoid that the scope of this short talk gets out of hand.

Focal dystonia is usually painless with the symptoms of muscular incoordination or loss of voluntary motor control over extensively trained movements. It affects 1% of musician population compared to 0.03% of the general population. Causal factors include genetic predisposition and gender (more males suffer from FD) and the disorder can be described as a maladaptive brain plasticity. A trigger is often involved (for example, in Leon Fleisher's case a cut to his right thumb), which intensifies the sensory input. Psychological factors such as perfectionism and anxiety have also been cited as trigger factors. In healthy musicians, there is an increase in finger representations in the sensory cortex. In musicians with FD, there is an overlap in the representational zones for the individual fingers in the same brain area, so the somatic sense of the individual fingers starts to merge together, creating a lack of ability to sense the individual fingers. Treatment options include botulinum toxin (BoTox) injections (something that often sounds more threatening than it actually is, but that is only effective about 49% of the time). FD is also treated with medications that inhibit muscle cramping, and pedagogical retraining. The pedagogical retraining techniques that have been already explored are reducing the instrumental tasks to levels where the symptoms don't occur (that is, playing slow enough or light enough that the cramping doesn't happen), altering the sensory input (i.e. by wearing latex glove while practicing), mental practicing techniques specifically tailored to neurological dysfunction, and using visual sensory input via mirror or video to be able to learn to distinguish dystonic from non-dystonic movements.

Investigations could be made into the use of specialized dynamic orthoses (devices worn on hand/wrist/arm that alter structural and functional characteristics of the neuromuscular and skeletal system), and using biofeedback techniques to reveal the presence of excessive muscular activity.

Tremor is an umbrella term that describes a symptom of several neurological diseases including Parkinson's Disease, multiple sclerosis, focal dystonia, and traumatic brain injury. It is treated pharmacologically again with BoTox, and other medications. Deep Brain Stimulation (a technique that sends small electric shocks to areas of the brainstem) has also proven to be helpful in alleviating symptoms. Because tremor takes many different forms

and is most often treated with medication, it's difficult to discuss general rehabilitative measures at the instrument. This is certainly an area where research further.

Peripheral nerve disorders: the most common is due to compression, but can also be caused by infection or disease. The symptoms include numbness, pain, burning or tingling, muscle weakness and sensitivity to touch. In many cases surgery is recommended though this should be considered with utmost care and only after consultation with several doctors, preferably music medicine specialists. Rehabilitation would involve work with a physiotherapist, chiropractor or osteopath if the nerve is damaged by compression. Peripheral nerves can regenerate themselves, so the chances of a full recovery are often quite good. Doctors often recommend resuming playing activities as a type of rehabilitation for the nerve, and sometimes prescribe music instruction for non-musicians to help with the healing process.

Ataxia is the loss of voluntary coordination of muscle movements usually caused by damage to the cerebellum, the 'little brain' located at the back of the head. Ataxia is also treated pharmacologically and through physiotherapy with techniques called PNF stretching and Frenkel exercises that train a person to use sight to improvement movement, much of this can be adapted to work at the instrument.

An interesting aside, music is frequently therapeutically when working with patients with ataxia. Listening to music can improve the walking abilities of people with ataxia, and can help improve or maintain their cognitive function.



Here we come to a list of a few well-known musicians that suffered from neurological dysfunction:

Robert Schumann: experienced a loss of control of RH middle finger. Possible causes: overuse/misuse, neurosyphilis, psychosomatic disorder

Gustav Mahler: involuntary movements of the face and unsteady gait in right side;

He may have had Sydenham's Chorea, an autoimmune response following infection

Leon Fleisher: RH dystonia with involuntary flexion to 4th and 5th fingers, if we have time at the end of the talk I'll play a very moving video that shows what this kind of flexion looks like.

Glenn Gould: neuropsychological disorders including dystonia in arms

Jacqueline du Pré: Multiple Sclerosis that caused progressive loss of sensitivity and control of movements (ataxia). In last concerts she relied on vision to compensate for a lack of physical awareness and control.



I'd like to use Clara Schumann as an example of someone who received a very novel (for the time) and effective treatment for her disorder. No one can say with certainty what caused Clara Schumann to suffer from chronic pain syndrome, something that periodically interrupted her performing career. Despite her father's reputation as a tyrant, he was surprisingly modern regarding his recommendations for practice: avoiding mechanical and monotonous exercises, incorporating diverse aspects of musicianship (theory, composition) into her training,

recommending practicing breaks with walks in the fresh air, and limiting practice to 3 hours per day. In 1857 at the age of 38 she reported in letters that she was suffering from pain as a response to overexertion. The ailments continued with increasing persistence and strength until she took an extended break from playing between 1873 until 1875. She began an intensive stationary treatment in January 1875 in Kiel, led by the renowned surgeon Friedrich von Eschmarch, here's an excerpt from a letter written by C.S.:

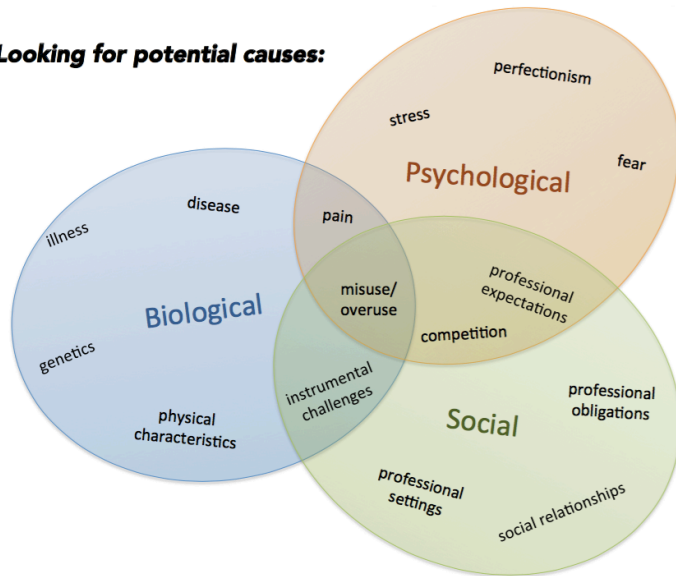
'I began the treatment on 27 (January), which consisted of massage, which was very painful at first but which improved after a few weeks. Even on the first day I had to play piano for an hour, despite the pain – Eschmarch insisted on this, whereas all the other doctors had strongly recommended rest – and the pains did not get worse as a result of it ...

Esmarch and his wife (the Princess of Schleswig-Holstein) are very kind people. Whenever he left (he visited me every morning) I felt happier than before he came. ... The pains in my arm improved a little, though not significantly, it was painful to play, but I played nonetheless, I now had the courage to do it – it was also a kind of treatment for the mind ... they tried to persuade me to play a concert, which at first really terrified me ... but Esmarch quickly brought the matter to a head when he said he was going to write a prescription for me – “Play a concert”, he needed to see how I coped with playing in public ... On March 18 I gave my first concert for nearly 18 months. It went very well and everyone was very sympathetic.

Esmarch can be considered one of the first doctors with an extraordinary sensitivity to the special needs of musicians, using an interdisciplinary approach that is today a standard part of therapeutic work with musicians. His encouragements to play regardless of pain would *not* be appropriate for many of the neurological dysfunctions I’ve been discussing here, but can indeed be effective for treating patients with chronic pain syndrome, by replacing a negative psychological conditioning regarding pain experiences with psychologically positive experiences while executing the same activities that had once caused pain.

So, by way of Clara Schumann’s exemplary treatment I’d like to talk a little bit about the **BioPsychoSocial Model** which serves as a fundamental principle for most music medicine clinics. The model states that human functioning in the context of disease or illness is influenced by a complex mixture of several types of factors, namely biological factors (such as genetic predisposition, disease, and body type), psychological factors (such as behavior patterns, stress, thoughts, and emotions), and social factors (such as interpersonal relationships, working environments, and financial well-being).

Looking for potential causes:



Trying to identify the cause of any dysfunction without looking into all three of these factors will most often lead to a superficial and insufficient treatment.

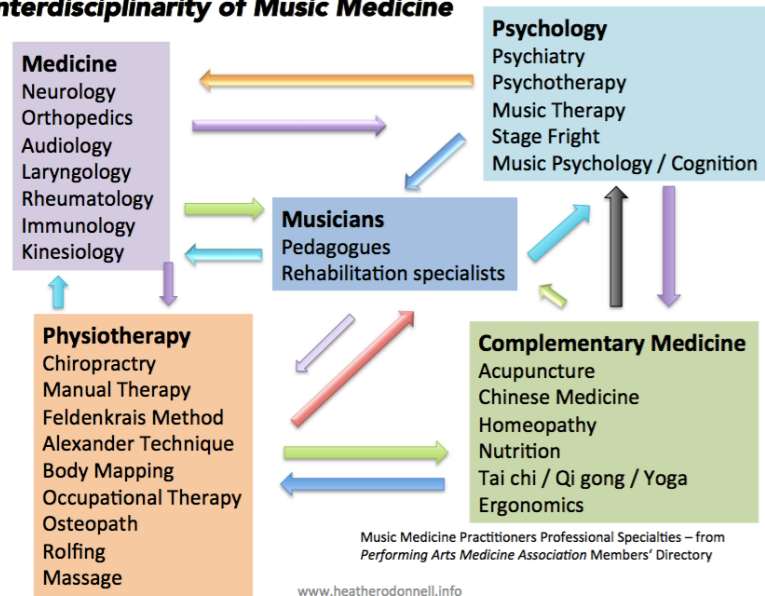
Therefore I come to a maddening array of treatment options for suffering musicians with the message, that if any

given practitioner – be it a music pedagogue, doctor or physiotherapist - offers a singular treatment plan without the mention of consulting another expert in another field- start running! This singular treatment will most likely be ineffective.

In my experience with various music medicine clinics, there is often an assumed hierarchy with music pedagogues viewed as underlings from doctors, psychotherapists, and physiotherapists. I would like to challenge this assumption and suggest that music pedagogues stand at the center of the therapy

process, they most often have prolonged and repeated contact with the suffering musician and can understand the rehabilitative needs of the musician with the most clarity and strongest sense of identification and empathy. With a highly committed musician, especially one who is in danger of losing his ability to play his instrument, the teacher will assume a place of influence regarding steps the student takes to address the health issue. It's important to be informed about all available forms of help in order to effectively

Interdisciplinarity of Music Medicine



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recommend to the student what kinds of medical and therapeutic interventions are available. It would be my recommendation to err on the side of seeking too much help from various practitioners rather than too little. Very rarely is a medical or therapeutic intervention actually something that does harm, though an example of a potentially harmful intervention might be a surgery undertaken before other options are exhausted. It does happen very often, though, that interventions yield no perceivable results, and that one feels led down a path leading to a dead-end. This is, unfortunately, a natural part of struggling with injuries and finding necessary help to overcome them.



"What I'm after isn't flexible bodies but flexible brains. What I'm after is to restore each person to their human dignity."
— Moshe Feldenkrais —

The Pantheon



Mabel Elsworth Todd
(1880 - 1956)

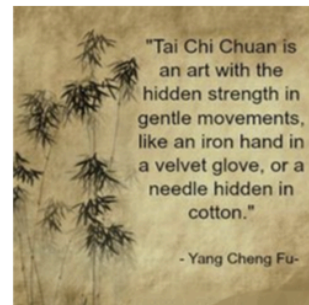
For every thought supported by feeling, there is a muscle change. Primary muscle patterns being the biological heritage of man, man's whole body records his emotional thinking.

— Mabel Elsworth Todd —



People do not decide their futures, they decide their habits and their habits decide their futures.

— F. Matthias Alexander —



"Tai Chi Chuan is an art with the hidden strength in gentle movements, like an iron hand in a velvet glove, or a needle hidden in cotton."

— Yang Cheng Fu —

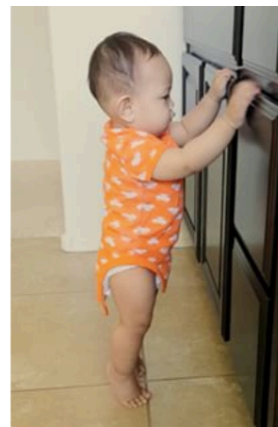
Working with injured pianists at the instrument, I'd like to offer some of my experience that I hope might be of help to others. I should state that my experience working with injured pianists is founded on and informed and inspired by observations and innovations of a number of pioneers in the field, Moshé Feldenkrais, Frederick Matthias Alexander, Mabel Todd, as well as movement principles from Tai Chi. Pianists Claudio Arrau, Alan Frasier, György Sándor, and Dorothy Taubman, have been influential regarding their thoughts on piano physiology and function and my teachers including Peter Serkin and Stephen Drury have passed on their enormous insight that I still draw on, almost 20 years after lessons

ended. I should mention that, notwithstanding these teachers' brilliance, knowledge and intuition, I see what I would call potential dangers or areas of misunderstandings in the work of all of the above-mentioned individuals. I'd recommend to each of you to carve out your own pantheon of teachers you draw from, and thereafter I'd highly recommend avoiding the "Guru Trap", the belief that all questions are solved by adherence to one particular method.

I'd like to address the topic of "position-based" technique. Much emphasis in piano pedagogy and especially in rehabilitative piano instruction is made on "correct positions", "correct" meaning postures that stray as little as possible from our natural posture at rest. I appreciate very much what Thomas Mark wrote about what he calls the Posture Myths: "Chest out, shoulders back, suck in your gut, flatten your butt... These military sounding admonitions pop into peoples' minds when they think of 'good posture'. They certainly are 'posture' in one sense offered by my dictionary: 'an affected or unnatural attitude, or a contortion of the body'. But they are not good. "



vs.



With the exception of very commonsensical observations about natural hand position during activities such as standing or walking, I have found descriptions of position to be of limited value with regard to piano playing, though I would recommend the kinds of sitting and standing exercises offered by the Feldenkrais Method or Alexander Technique. We work as pianists with *imagination-driven movement*, not positions, and seek a quality of movement that allows our musical intentions to be expressed unimpeded. We seek a unity of the playing mechanism, where the body and instrument are fused so synergistically that the point where one ends and the other begins is often malleable. Thinking about positions,

either in terms of starting positions or as a way of playing analogous to the frames of a motion picture - that is: sped up individual shots that gradually fuse to make the impression of movement - seems at best to be of limited help and at worst counter-productive to creating an awareness of movement. When encountering a pianist that breaks the arm/hand axis through the wrist with an unusual extension or flexion of the wrist, I've found it consistently more effective to ask myself *why* they need to assume this posture in their playing at this point. Is there a lack of structural integrity somewhere else in the playing mechanism that makes it necessary for the pianist to achieve stability in the wrist joint? Instead of immediately changing the position, it seems to be more effective to find out why the unusual playing approach is there and to see if it is a result of a compensation due to weakness or lack of structural integrity elsewhere. Compensations are an indication of a subconscious somatic intelligence, and should not be simply removed, as we would not surgically remove a finger that had been aching for some time. Compensations can be used as valuable information for structural weaknesses and moving from a compensation to a healthy movement often requires time and patience, there are no quick-fixes.



Four unusual ways of holding hands, Clockwise from top right: Rachmaninoff, Fleisher, Monk, Horowitz

So, the concentration in lessons with injured pianists moves from “correct positioning” to the student possessing a deeper awareness and knowledge of movement. This awareness and knowledge can be experienced in several ways.

There are pianists who approach their art with an analytic precision (here's a quote from Glenn Gould's diary):

No playing during past 3—4 days. Upon approaching piano, some degree of control was evident, but following problems were in evidence as well:

1. Trill control hazardous esp. In stretched hand position (D major

Partita); 2. Frequent 'sticking note' syndrome; 3. As result of above, dynamic unevenness much in evidence; 4. Still too much 'downward address' syndrome 5. Collapsed spine and shoulder correlation were used, but from time to time reversion to curved knuckle was tried; it temporarily stabilized dynamic control, though at a very restricted range

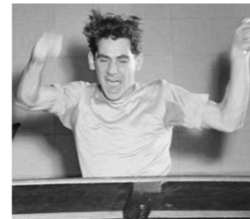
For these pianists who are very analytic in their approach, it's important to be able to provide sound information on bio-mechanical principles, physiology and anatomy. It is helpful to have materials available (for example a model of a skeleton, or an anatomy book with well-designed illustrations of muscles, tendons, ligaments and bones). It's equally important to sense if their quest for an intellectual understanding of playing mechanisms is matched by a somatic and often subconscious integration of these facts. After having 'met' these students on their level of intellectual understanding, I would introduce other ways of experiencing these processes, for example by means of imagery or tactile information.



Many pianists respond strongly to imagery. I find imagery to be one of the most effective ways of condensing immensely complex processes into something more tangible and clear, this is of course something that all music pedagogues draw on in one way or another. Here the practice of Ideokinesis can be very helpful. **Ideokinesis** is an approach to the improvement of body movement, in which visual and tactile-kinesthetic imagery guide the student towards a healthier form. Examples that can be helpful for pianists include imagining the arm filled with heavy wet sand, and tracing the development of the sand distribution through a range of movements (for example: sand is more or less evenly distributed while arm is lying flat, sand becoming gradually consolidated in elbow and finger tips as arm is lifted by wrist joint). The tree image shown here is valuable to pianists of all ages, from beginners through advanced students as well as pianists struggling with injuries. The student, actively and with great engagement and strength of imagination, imagines the roots of the tree growing into the seat through the sit bones, and the floor through the feet, and perceives the miniscule and yet ever-expanding growth of the tree-top. When we work through imagery we can gain access to fine

musculature that is normally not able to be controlled by conscious instruction, the quality of “being a growing tree” will be much different from the instruction to “sit tall”.

What is movement without context?



Intention in playing: human movement is notoriously difficult to study scientifically because human movement rarely exists for its own sake. As musicians, we move to realize an intended musical tone, phrase or color, we move to express an emotional state, or we move because we want to get somewhere. Decontextualized movement can be informative and helpful in certain circumstances, for example the rehabilitation of focal dystonia, but it always carries with it an aura of being unnatural or disembodied. Whenever possible in lessons, movement is tied to an intention. To trace through muscle chains from hands to back, we *want to push* the piano towards the wall in slow motion. With the intention of ‘pushing’ the quality of the movement changes from that of merely activating muscle groups. To increase focus in fingers, we pretend that all fingers are index fingers, even the thumb, that urgently want to ‘show’ us something. We very often combine playing with speaking. We are all natural virtuosos in terms of our ability to speak with nuance, communicating messages and emotional states with a finesse that can be transferred effectively to the fingers, hands and arms (fingers= tongue, hand = mouth, arm = facial expression).

One last aspect I’d like to touch on, no pun intended, is that of tactile communication. One aspect of various pedagogical traditions that has always seemed immensely valuable to me is an acceptance of a degree of physical contact within the lessons. The quality of



Barenboim touches Argüerich's hand
before beginning to play

learning that takes place by guiding a student's hand, or placing a hand on his or her back to increase awareness is invaluable and often a much more direct form of communication than when the movement is translated verbally. Often I apply my hand weight to a student's hand to see if they can maintain the natural structure of their hand and to increase their sensory input. When a student is challenged with finding his roots, a hand on top of the head or on the shoulders can be helpful to help with a sense of grounding. In my rehabilitative work with other teachers, I often did floor work, the floor serving to increase sensory awareness of parts of the body not easily experienced in our visual sense, like the shoulder blades, back of the arms, and the back. In the wake of several horrible abuses of power in music conservatories, this kind of tactile work is very often avoided nowadays. Finding a way to reintroduce it into lessons in a secure and non-threatening way would be a very valuable goal for every pedagogue.

We come to the end of this talk. I'd to offer two take-home messages.

First, please embrace the individuality of each musician and their injury. Classification systems are not made to fit individuals onto a system, but to classify a group of symptoms with the intention of better researching illness and helping an individual recover from it. As every individual is unique, so is every pianistic dysfunction unique in its origin, and treatment and rehabilitation options.

Secondly, accept and embrace the complexity of the subject. Deducing complex issues into basic components can be a valuable process and is integral to much scientific inquiry, but the process very often degrades one's ability to grasp the breadth and wealth of any given experience. When working with issues of pianistic injury, as a patient and a teacher, I've found cult-like adhesion to a method offering simple fixes to be very detrimental.

In closing I'd just like to say, please be in contact if there's anything I can do to help you or a student. Right now I'm based in Berlin, and will be moving next month to Rochester, New York.



Leon Fleisher: Bach Aria *Schafe können sicher weiden, Sheep may safely graze.*