

Piano Technique

To MPPA Readers—I am an amateur pianist enquiring into improving piano technique but feeling slightly disillusioned by the lack of attention given to technique in the field of piano teaching. And whilst, however, there are many books out there written by great pianists that seem to combine logic, empirical knowledge, and scientific knowledge in a very convincing manner, their assertions are void of being subject to strict scientific investigation and therefore, in my opinion, cannot be treated too seriously.

This is why I have been looking at academic pieces on piano technique in journals such as *Medical Problems of Performing Artists* and have been slowly learning more credible information on technique. I have been able to get hold of a handful of pieces; however, it seems there are in fact hundreds of relevant pieces that have been written. In which case, it seems surprising that none of the books available on piano technique make use of, or reference to, the findings of the various studies and articles.

Is it that there has not been enough consensus between these papers for any valid assertions to be made? Or is there in fact a wealth of valid information to be learnt from the studies, which pianists today can apply with much more faith than what the collections of piano technique books say without much proof or foundation?

Many thanks,

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Replies

Indeed, there are numerous books written on piano technique. Piano technique has evolved from finger technique, to the use of arm and relaxation, to the modern coordination. All three schools are valid, as each was a result of responding to the changing development of the instrument and composers' demands on the sound and body. Unfortunately, some current piano pedagogues still try to favor one school against the other(s).

Luckily, there are a few good books that address the complete piano playing mechanism from finger to brain. The following are scientifically sound and artistically viable books: CPE Bach's essay on the "True Art of Playing Keyboard Instrument" (1753) paved the foundation of finger technique school, but he also addressed the movement of the arm, shoulder and mind. George Kochevitsky's *The Art of Piano Playing* (1967), William S. Newman's *The Pianists' Problems* (1950), Otto Ortmann *The Physiological Mechanics of Piano Technique* (1929), and Abby Whiteside *Mastering the Chopin Etudes and Other Essays* (1969) are some of the classics that are useful.

Numerous other good books exist such as by Matthay, Schultz, etc., but there are problems with semantics among various authors that cause confusion. There are also excellent tech-

nique books (music) that are often neglected today: *Exercises* by Isidor Phillip, Alfred Cortot, Brahams, off the top of my head.

The reality is that piano playing technique is all about body-mind coordination rather than precise mechanics. Due to individual differences, the common book-learning is limiting if not impossible. As an amateur pianist developing techniques on one's own, I would pay attention to how the body feels, particularly tension and minor discomfort. In my own research, knowing one's hand biomechanics (size, span, mobility, weight) is posited as a solution to many tension problems.

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Science has given us a number of valuable tools for studying piano technique. By employing scientific thinking and methodology, we can help objectify our observations, yielding findings that are more generalizable and less prone to individual idiosyncrasy. Moreover, the peer-review process by which empirical studies are vetted prior to publication does increase our confidence about the validity of findings. However, studying piano technique from a purely scientific approach is fraught with problems.

First, there is the issue of complexity. The more discrete a task, the more we can define its activity in biomechanical terms. Playing the piano is not like throwing a discus or performing a high jump. The movements are intricate, vary widely according to the demands of the music, and are performed over long periods of time. Studies in which piano technique is examined using objective (scientific) methodology and instrumentation tend to focus on a small, isolated motion made in one particular task (e.g., flexor activity when playing diminished 7th arpeggios) or more global motions that do not vary as much in response to task demands (e.g., force loading of the trapezius over the course of a practice or performance session). Basically, one can see the trees or the forest from this perspective, but not the entire picture. Thus, findings from these scientific studies can be quite difficult to apply to the "real world" task of playing a piece of music at the piano.

Secondly, there is the problem of establishing norms. Given the complexity of the playing task, though we can observe and describe the motions made by pianists using scientific inquiry, we do not have biomechanical or ergonomic norms to compare them to. While we could probably establish norms for each and every isolated motion used in piano technique, playing the piano involves virtually infinite permutations and combinations of these motions into larger movement patterns. This is especially true for the smaller motions made more distally (i.e., hands, fingers, etc.). Simply appealing to anatomic norms doesn't necessarily help us, since most of the injuries that arise from piano-playing result from activity in which normal anatomic limits for range and/or force are never exceeded. Confounding variables include repetitiveness and length of activity, posture, type of musculoskeletal loading (dynamic or static), how force is applied (steady, intermittent, etc), temperature and other environmental considerations, cognitive demands, and psychosocial dynamics.

Finally and most importantly, what scientific criteria should we apply to determine what constitutes a beautiful, exciting, or moving performance? These types of criteria are subjective and can only be experienced and described anecdotally.

Both anecdotal and empirical studies have their limitations, which good researchers understand and acknowledge. One perspective is not necessarily more valuable than the other (though, of course, one must acknowledge that there is good and poor quality work of both types). Rigorous work in each area can offer us valuable information in understanding piano technique. In the end, piano playing comes down to imagining a sound and then using the appropriate technical tools in order to bring that sound forth. Good piano pedagogy attempts to systematically guide students in establishing both the musical/artistic and technical skills to this end. Logic, anecdotal experience, and sound knowledge of scientific principles should all be brought to bear.

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To answer your question, today's teachers are more focused on a healthy, ergonomic approach to the instrument than ever before, with a number of significant books and videos by knowledgeable pianists who have devoted their careers to researching this topic available in today's marketplace. However, you are correct—often the ideas presented have not consistently been “scientifically” scrutinized. While there are absolutes that must be considered when teaching technique (laws of physics, biomechanics of the body, and the mechanics of the piano), how each individual interacts with all of those absolutes is unique, requiring teachers to customize what is said to each student. As a pianist helping my students expand their artistry, I feel it is important to teach the basic principles of healthy technique, but try to avoid teaching them in a vacuum since every gesture is so interconnected to sound production. Technique serves as the tool that allows each individual to express the emotion of the music. Having a good technique allows the movements we engage in to generate the appropriate sounds and to also enable the performer to effortlessly communicate the composer's vision. Effortlessness is the key to spontaneous and artistic musicality.

It is difficult to place scientific measures on artistry. As you stated, many pianists who author books are presenting “logic, empirical, and scientific knowledge” that often has not undergone scientific testing. However, I feel there is a great deal of consensus today amongst pianists and pedagogues about what constitutes a healthy, effortless technique. For many, this information, combined with an individual's own experiences,

provides more than sufficient guidelines to develop a natural approach to the instrument. New technology is providing more insights and scientific verification. Technology using surface electromyography has recently become available to provide a way to scientifically assess the efficiency of our technique with equipment that monitors the degree of physical tension held in targeted muscles as we perform (see *MTNA eJournal* Sep 2010 and Apr 2011). This can provide a window into the body to confirm how effortlessly we are working. As more medical professionals and research-oriented pianists seek validation of effective technique, more scientific studies will likely emerge. Regardless of the approach we choose, the effectiveness of good technique will still be judged through performances that display effortless artistry.

As you mention, there are many outstanding pianists writing and lecturing on the topic of piano technique. As an example of an article you might find useful, consider accessing one of MTNA's (Music Teachers National Association) “Ten Essential Skills” articles—“Essential Skills for Promoting a Lifelong Love of Music and Music Making: Developing the Fundamental Skill: Healthy, Injury-Preventive Technique,” written by Barbara Lister-Sink. Available at: <http://www.mtna.org/publications/american-music-teacher/essential-skills-series/essential-skills-part-2/>.

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Several studies have shown a correlation between body alignment/hand position and efficient use of muscles (Riley et al., 2005, 2010, 2011). The 2005 article in *MPPA* correlates surface electromyography (sEMG), video, and MIDI data tracking improvement with changes in hand position. Improper alignment can result in high sEMG readings of muscle activity. Without trained release of such levels of activity, continued practice can result in overuse injuries. The sEMG graph shown below displays symmetry of recruitment between left and right extensor muscles during playing, and during rest phases the muscle activity returns to baseline.

As Carl Seashore stated in the 1930s, the only two parameters that can be controlled on a keyboard are timing and velocity. In his book, *The Capture of Inspiration*, E. Robert Schmitz gave a very detailed list of every muscle involved in playing the piano and how it should be used. Schmitz defined technique as “the most economical way to produce adequately what the mind conceives artistically.”

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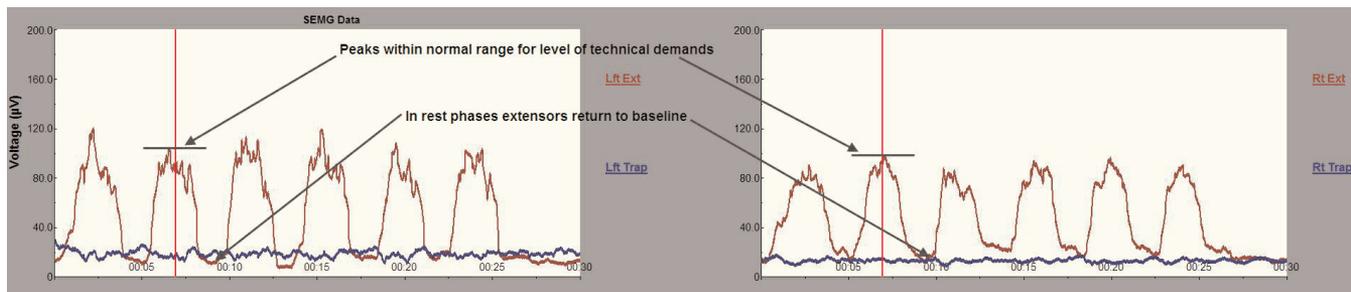


Figure. sEMG showing recruitment of left and right extensors during playing and rest. (see Riley).

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To the Editor—I am writing in response to Matthew Arthur’s letter in the June issue, and the replies thereafter from Drs. Lee, Riley, Wristen, and Professor Berenson.¹ While I appreciated the replies, I believe they overlook a larger issue in the profession: the fundamental lack of anatomical and biomechanical knowledge among many, and perhaps even most, piano pedagogues. The great pianists with scientific knowledge referenced by Arthur are outliers. Most piano teachers in the United States would not understand Dr. Wristen’s mention of flexor activity, much less force loading of the trapezius.

Say the word *trapezius* to your average undergraduate or tertiary-level music students, and they will look at you like deer in headlights. These same students can usually offer a credible definition of *crescendo*, despite not being native speakers of Italian. They can give you the birth and death dates of Johann Sebastian Bach, the pitches that comprise any of a number of major and minor scales, and, by the time they graduate, the application of hexachordal combinatoriality. These same students will not be able to tell you how many bones they have in their wrists. They will not understand the motion of the radius bone relative to the ulna in pronation and supination. They will not know what pronation and supination are. Neither, sadly, will most of their peers enrolled in graduate programs in music.

How then, should we expect current and future piano teachers to be able to read and comprehend the academic pieces on piano technique in journals such as *Medical Problems of Performing Artists*? How can we expect them to subject the hypotheses of those pedagogues who write about technique to strict scientific investigation? They will neither use nor reference the findings of studies; they will not evaluate any consensus to be derived from

them, when they cannot comprehend them. Indeed, they may never read them, lacking the vocabulary to determine, from reading an abstract, whether any given study is relevant to their work.

I am not asking all piano teachers to become scientists (though I might argue that the experience of teaching piano involves the near-constant generation and testing of multiple hypotheses, albeit with very small sample sizes and too many variables). I am suggesting that it is truly not difficult to introduce pianists to concepts of functional anatomy, and that such an introduction could well change the future of piano pedagogy *vis-à-vis* technique. A cursory glance at the 2012–2013 handbook of the National Association of Schools of Dance reveals that the association considers a “fundamental knowledge of the body and kinesiology as applicable to work in dance” to be an essential competency for dance students at the undergraduate level. The National Association of Schools of Music’s 2012–2013 handbook contains no similar language. If anatomy and kinesiology can be taught to dancers, surely they can be taught to musicians. Musicians need to decide, in sufficient numbers, that such knowledge is not only applicable, but also relevant, to work in music. I am of the opinion that the more we know about the body, the more readily we can target Schmitz’s “most economical way to produce adequately [or optimally!] what the mind conceives artistically.”

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1. Arthur M. Piano technique [letter]. *MPPA* 2013; 28:115.

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