

Foreword

Aided by information provided to me by our Guest Editor, I would like to introduce briefly some of the authors with whom the regular readers of *Seminars* may have no acquaintance since they are not physicians or publishing in the medical literature.

Samuel H. Nelson is a Feldenkrais Practitioner with an office in Rochester, New York. He is a graduate of the Feldenkrais Foundation's Toronto Professional training (1984–1987) and a member of the Feldenkrais Guild. He earned a Ph. D. in Environmental Studies at the University of Wisconsin Madison, and also holds a B.A. and M.A. in economics. He has worked at the Argonne National Laboratory and Energy Systems Research Group.

Terry Boyarsky, certified Dalcroze Eurhythmics teacher, has degrees from Reed College, the Cleveland Institute of Music, and the Dalcroze School of Music in New York City. She has taught Eurhythmics at the Cleveland Institute of Music, School of the Cleveland Ballet, and the Chautauqua Institution. Ms. Boyarsky has given many workshops and presentations and is well known for her work with preschool children.

Richard Killmer is a concert oboist and Professor of Oboe at the Eastman School of Music, Rochester, New York. In 1984–1985 he was awarded Eastman's Eisenhart Award for Excellence in Teaching. Prior to his academic appointment, he was principal oboe of the St. Paul Chamber Orchestra for 11 years, as well as principal oboe and major oboe teacher at the Aspen Music Festival for 7 years. He is a founding member of the American Reed Trio.

Marcia Baldwin's academic teaching career began at Indiana University and continues at the Eastman School of Music where she holds a tenured position as Professor of Voice. Ms. Baldwin continues an active career in operatic performances, recital tours, and symphonic and oratorio engagements. Many of her students enjoy successful careers themselves, appearing internationally with major festivals and opera companies.

Jeffrey Solow, cellist, balances a busy schedule as soloist, chamber musician, and teacher. He has appeared with the Los Angeles Philharmonic, and Seattle and Milwaukee Symphonies, among many

others, and he performs as guest artist at numerous chamber music festivals internationally. He is Associate Professor of Cello at Temple University, Philadelphia, and a permanent member of the New Arts Trio.

Rebecca Penneys' performances as a recitalist and chamber musician have enchanted audiences for more than two decades. She is equally fluent in classical and contemporary literature and is highly regarded for her ability to lead lecture demonstrations and seminars. Penneys is a tenured Professor of Piano at the Eastman School of Music, Chair of the Chautauqua Institution Piano Department, and founder of the internationally acclaimed New Arts Trio, 1980 winner of the Naumburg Award. She sometimes performs with her husband, pianist David Burge, who is an authority on 20th-century music. Pianists from many countries come to join her classes.

Critics have praised Professor Penneys for her ability to "caress a phrase or thunder a passage with equal appropriateness," for her "inborn felicity of phrasing," and for her "power to penetrate deeply the heart" (that last phrasing is from a Tokyo newspaper). The *New York Daily News* wrote of her: "Rebecca Penneys is blonde, pretty, moves like a dancer, but has the strength of an Olympic gymnast and plays the piano like a tamed whirlwind."

When Rebecca writes that, as a child, she "*was* music," she is describing herself in words that transcend metaphor: like the truth of the Transfiguration of the Host during the Mass, the truth of her words can be understood only imperfectly, even by those most willing to accept it. As a child she sang, she played, she danced—and when she left childhood she danced professionally with the San Francisco Ballet—but, then, she was more than a performer of music: she *was* music. Today, in maturity, she has her talent, her "curse" of perfect pitch, her ability to infuse emotion into her playing (and to make me cry when I hear her play), but she has the added dimensions of a whole person, someone I am pleased and honored to call my friend.

David Goldblatt, M.D.
Editor-In-Chief

Preface

It is my great pleasure to be the Guest Editor of this issue of *Seminars in Neurology*, which is devoted to music and medicine. I hope that it will help encourage a continued setting for communication between physicians and musicians, so that eventually a common language will emerge, one that is a synthesis of thoughts, feelings, and knowledge from both the scientific and artistic worlds.

In setting up this issue, I thought it was not only important to hear from physicians who are interested in the many questions, issues, and injuries surrounding music and music performance, but for them to hear from musicians as well as other selected professional people who are particularly concerned with overall body health and ease of physical movement.

This issue spans a wide variety of subjects. Not all the areas covered here are addressed by both groups. In my opinion the different perspectives on this subject have much to offer one another. We can begin to see how much we have to share, given our different educational backgrounds, modes of thought, and individual experiences in practice.

For months, now, I have had the privilege of exchanging many ideas about these matters with David Goldblatt. Together, we have even explored the problems of specific musicians. He has been interested and open, and because of his encouragement and persistence I was finally persuaded to develop a publication specifically with the kind of format that follows.

My colleagues and I appreciate this opportunity to express ourselves directly to you. We hope that these contributions will let you in on not only our thinking about and teaching of music, but also what we are experiencing as performers. Just as importantly, I want to thank the physicians for their interest, generous contributions, and contin-



ued great efforts in helping us all survive our journey through life.

I am sure that we will all agree that a publication such as this adds another piece to a bridge that needs to be built between us. It is my hope that one day after all this becomes one body of knowledge there will be more health and more music in our world.

Rebecca Penneys
Guest Editor

Motion and Emotion: A Discussion of the Interaction Between Physical Motion and Human Emotion

Rebecca Penneys

MY PATH

I gave birth to the phrase "motion and emotion" about 10 years ago. Although it seemed at the time like an instantaneous insight, it really and truly had roots about 25 years old. The phrase resulted from my focusing on the general topic of how to play any instrument, especially my instrument, the piano, with ease and comfort. Motion and emotion is really the theme of my life thus far: it put old subjects into a new context. I would like to explain briefly how I became caught up in this fixation, which had a complete hold over me by the age of 13 years.

My family was very interested in and concerned with developing their child's natural aptitudes and abilities. By the age of 3 years, I was singing, dancing, and playing the piano by ear, and I played all my brother's and cousin's piano pieces. I thought I *was* music. I loved piano and dance equally and was happy to begin lessons in both. Even as a child, I seemed to need both art forms in order to feel balanced. Looking back, I can see that my education was very different in each area. My dance training was terrific; my piano training less so. As a result, I felt the first symptoms of real trouble at the piano early on. Sometime during my childhood years, I realized, too, that I had been recruited into the child prodigy syndrome of the 19th century. It was clear that I would become a concert pianist.

My early dilemma was that the personal expression and sense of communication common to

both art forms, dance and piano, felt entirely different and almost opposite in nature. This seemed odd, since in both instances I was reacting to music. There seemed to be no way for me to feel really comfortable at the piano. Sitting there felt restrictive and confining to my natural urges of self-expression. The movements of dance, on the other hand, felt like liberation and exhilaration. I felt at one with the music and I was fortunate enough to feel my whole body in balance and moving gracefully in a liquid, horizontal manner. The piano felt rigid and vertical and, consequently, I could not become one with the music. My body was an outsider to my physical and emotional needs. By the time I had actively started to concertize, at age 17 years, I was having trouble with fatigue and tension during certain larger works and concerti. An image of the solution was already screaming inside my head. I somehow had to combine the two art forms. I had to take my positive dance knowledge of how the body works and how it feels when it is free to react and respond naturally to movement and transpose this to what would work in relationship to the piano. I needed to have this floating, effortless, dancelike feeling at the piano; otherwise, I could not play comfortably. It was clear that I could not put up with this discomfort for the rest of my life.

In subsequent years, both the concert stage and the teaching studio have enabled me to build a bridge between physical motion and human emotion. First and foremost, the pianist and the piano have, so to speak, to learn who they are and what

Professor of Piano, Eastman School of Music, Rochester, New York, Chair, Piano Department, Chautauqua Institution, Chautauqua, New York

Reprint requests: Rebecca Penneys, Eastman School of Music, Room 206, 26 Gibbs Street, Rochester, NY 14604

Copyright © 1989 by Thieme Medical Publishers, Inc., 381 Park Avenue South, New York, NY 10016. All rights reserved.

they do, and how to relate to each other. I am convinced that with this knowledge musicians can enjoy and communicate their art without obstacles or painful restrictions.

SELECTED ASPECTS OF MOTION AND EMOTION AT THE PIANO

THE BODY AND THE KEYBOARD

Ask any performer: playing and performing on any instrument, including the piano, is a naturally sensuous experience. The piano is an instrument that is about 185 years old. Its three chief predecessors are the fortepiano, harpsichord, and clavichord. It is important to understand that music written before the first quarter of the 19th century was not performed on our present instrument. The differences in construction are significant for these instruments as well as for the organ. Each not only sounds different and works differently, but each also feels different and needs a particular physical application in order to be played well. It is obvious that the popularity and persistence in our culture of both piano and organ can be accounted for by their superior capabilities in tonal resources. If one decides to play Bach, for instance, on the modern piano rather than on the original instruments—clavichord, harpsichord, or organ—one must apply oneself in a way that is physically compatible to the modern piano regardless of choice of style and interpretation. Clavichord, harpsichord, and organ technique are out of the question. To play any instrument well, one ought to have a clear understanding of its mechanical structure coupled with an understanding of how one's entire body best works in relation to the particulars of the selected instrument.

The forerunners of the piano are all delicate and sensitive sounding and feeling creatures; they reflect the emotional needs of their time. All art forms in the 19th century were quite different from those of preceding centuries, and the "modern" (19th-century) piano is designed to cope with the raging passions, emotional extremes, imaginative innovations, and physical virtuositities of the time. In the end, of course, it is the subtle contact of fingers on keys that permits any of the keyboard instruments to speak.

Like all other keyboards, the piano is basically user-friendly, and like any other keyboard mechanism, what is true for one key is true for all keys. The physical repertoire or body language of the piano was born in the 19th century, beginning largely with the burst of creative energy from Beethoven. The ability to play fast and to do things

like trills, tremolos, repeated notes, to play very loud or very soft, to play long successions of octaves and large four- and five-note chords, and to move quickly from one end of the keyboard to the other are all language needs and therefore physical needs of the 19th- and 20th-century repertoire. In my experience as student, teacher, and performer I have learned that this must be the point of departure for successful pianism. In fact, I have never encountered or heard about a pianist developing any kind of serious discomfort or persistent physical ailment from playing only baroque and early classical music. What seems to be the problem is that the old harpsichord, clavichord, fortepiano, and organ techniques, which involve playing either solely from the finger, with a low and rigid wrist, or from the forearm, with pressure and not weight transfer, are inappropriately applied to 19th-century piano repertoire and to the modern piano. We all, so to speak, learn to play other instruments on the piano, then we crash and fall apart when we arrive at the more complicated physical needs of 19th- and 20th-century repertoire. Small and limited muscle groups are asked to do the impossible. Eventual injury is inevitable. The piano music of the 19th and 20th centuries is designed to engage and employ the whole body.

A word about the piano keyboard. The piano key goes down and comes up. This is simple enough. The pianist who can feel the key moving smoothly in both directions has maximum control of the action. A typical key travels a total distance of about three-eighths of an inch. Weight of 1 or 2 ounces is sufficient to depress it completely. The piano mechanism also includes something pianists call "repetition" and piano manufacturers call "after-touch." This means that the key does not need to come all the way up before the note can be repeated. It is very much like the repetition built into the keyboard of a electric typewriter or computer. It is so subtle on the piano that most piano students have initial difficulty locating this sensation. For those who are interested, it is just below the "bump" in the action. Moving from the bump to the bottom of the key bed again and again produces a smooth repetition or legato "inside" the key. The ability of the key to come up by itself (escapement) whenever the 1 or 2 ounces of weight are removed plus the wonderful efficiency of the repetition make the modern piano action respond well to the principle of weight transfer beginning at the upper arm and extending to the finger pad, like a see-saw. This is quite different from using only finger movement, with the forearm or upper arm "cut off" from the rest of the body, involving a fixed hand position with tension and pressure.

What this all means is that the basic finger ac-

tion required to play the piano economically is, practically speaking, very small. The modern action is very energy efficient. Weight transfer is a subtle sensation and works only if the hand is somewhat relaxed and flexible. For loudness, hands and arms can absorb our whole body weight. For very fast playing, the already small movements must become even smaller. Again, no pressure is needed, and as far as finger independence is concerned, any normal person who can wiggle his or her fingers quickly has quite enough already. One does not need extra finger muscles to play the piano. Finger exercises, after all, are not music and drilling them endlessly does not prepare the body in any way either to play or to experience real music. Music, like any other language, does not consist of miles and miles of endless and meaningless repetitions of words, scales, or arpeggios out of context and done over and over again. One does not need to practice these endless finger exercises unless one is intent on waging war against what the action already does for the pianist. One needs to feel what the piano does and how it accomplishes what it has been built to do.

So far, in all my teaching experience, I have found very few piano students who understand the importance of the key moving in both directions. The downward motion of the key actually produces the sound, and the upward release predicts and times the next sound. Most piano students are still struggling with a lack of knowledge about their present instrument and its capabilities. They confuse the mechanism of the piano with that of its predecessors. For instance, they press heavily on the key to keep the sound going when the tiniest bit of arm weight would do. From the piano's point of view, only the right pedal can really extend the life of a piano sound. If only these pianos could talk! They would help me explain how all varieties of touch and tone are more easily produced by larger muscle groups than by the smaller muscles of the finger and forearm.

The piano is about two to three octaves longer than its three ancestors, and this means a great deal of added horizontal movement for the pianist. Again, looking back into the music of the 17th and 18th centuries, horizontal movement is only occasionally and modestly required. Figures and figurations themselves are hand-size or smaller, which means that most intervals are less than one octave. Even the dynamic range is less taxing and does not require the enormous sounds that both 19th- and 20th-century music and big concert halls require. On the other hand, the emotional display and lateral movements in the music of Chopin, Liszt, and Rachmaninoff are great. Therefore to be comfort-

able at the piano, the pianist, its operator, must widen his or her perspective. To have equal distribution of muscle tension is an appropriate goal, so that meeting the demands necessary to cope with all of this does not become excessive for any one part of the body. In real life or in life at the piano, it becomes clear that to move laterally, quickly and easily, to glide along the surface of the keys, one needs to involve the upper arm. To put it another way, all smooth speed movements have their own *porte de bras*, and this, of course, involves engaging the muscles of the upper and lower back. An efficient operation of the arm supported by the spine, back, and lower limbs determines the vast majority of quantities, qualities, and various tempi of piano sounds. The ability to express exactly what emotions one desires stems from an exact knowledge and control of the operator and all his or her operations.

Naturally, it takes a while to become completely comfortable with the mechanical aspects of the keyboard so that what the piano does becomes very predictable and so that all pianos feel much the same. At this point, practicing should shift to how one wants the music to sound. Paraphrasing my former teacher, Gyorgy Sebok, I tell my own students that all practicing is communication, like writing letters left unsent: completed endeavors except for either audience or postage stamp. Many works were written by composers for their own students to play. Two good examples are the "Well Tempered Clavier" (1722 and 1744) by J.S. Bach and the Twenty-Four Etudes, op. 10 (1828-1832) and op. 25 (1832-1836), by Frederic Chopin. All these pieces help students to learn the language of their instrument. In the former case it was the clavichord and harpsichord and in the latter case the piano. Just looking at these scores as pictures, even if one does not have the ability to read music, will clearly show their extreme difference (Fig. 1). Regarding the Chopin Etudes, it is impossible to play them easily and well individually or as a set of pieces without using one's whole body. Each etude tells its own story, physically as well as musically. My image of playing, similar to that of a well-tuned dancer, is based on an exploration of how physical motions of the entire body, not just the hand, mix together and are heard through the medium of the piano.

As the 19th century progressed, physical explorations and showmanship along with heightened personal emotions become even greater. Concerts and concert halls begin to emerge as Liszt becomes the all-time virtuoso. For example, he remarkably transcribes the Beethoven Symphonies for piano solo (1837-1864) and creates his own

PRAELUDIUM XXIII

A

B

Figure 1. A: J.S. Bach: Prelude in B Major, the Well-tempered Clavier, Book I, measures 1–15. B: Frederick Chopin: Étude in A minor, Opus 25, No. 11, measures 83–96.

Transcendental Etudes (1851). By the 20th century, most composers are no longer concerned with piano technique. One cannot find a better example than the writing of Iannis Xenakis (b.1922-) (Fig. 2). Although the use of the finger alone is very important, because it makes the final connection between the pianist and piano, it is the end and not the beginning of the total body motion and function, no matter how small or subtle. To play forte, one must involve the muscles of the upper arm as well as back and legs. To play triple forte, one uses all the muscles of the lower torso and one's total body weight. Liszt is said to have told his students that the hand really starts at the shoulder. Whether he said it or not, this is a wonderful image!

BREATHING AND BODY LANGUAGE

Trite though it may sound, the phrase "there is no life without breath" applies to every aspect of music-making and therefore to the piano as well. Most of my students arrive having already received extensive training, yet it would be fair to say that they not only feel uncomfortable and tight at the piano, but they complain about not being able to

get the piano to do what they want it to. They have learned to concentrate so hard intellectually that many other functions have become neglected or weakened. Their imaginations have become stifled. It is very common to find pianists who have replaced normal breathing with long periods of holding their breaths or with little shallow, jerky inhalations. When this is pointed out to them, they are astounded. Singing aloud, not humming, is perhaps the best way to reunite a person with his or her normal body functions and feelings. Unwittingly, while learning the piano, people sometimes turn themselves into little machines, forgetting the basic fact that music is a language of communication similar to any spoken language. Therefore efforts to unite the piano with our humanness would work out better if the piano were somehow envisioned as and made to be more human. The human being communicates through the use of the body, which is then channeled through the tool, the piano. When we sing, or talk, we respond physically and naturally to what were singing or saying. We all move with our own expressions, our own characteristic motions and emotions. We automatically and simultaneously release physical and emo-

Figure 2. A: Franz Liszt, Transcendental Étude No. 6 "Vision," measures 50–56. B: Iannis Xenakis: *Herma—Musique symbolique pour piano*, measures 64–73. (Copyright 1967 by Boosey and Hawkes Publishers. Reprinted by permission of Boosey and Hawkes, Inc.)

tional feelings. Breathing normally and deeply, as one does in a relaxed state or in sleep, helps melt the statuelike postures and awkward rigid positioning that are wrongly used while playing an instrument. The musician feels best, when, like the dancer, his or her movements and breathing resonate with the timing of the music being played. After all, music is an art form that exists in time, not out of time. One must remain in continual motion.

Physical abuse on the piano starts with sitting in what I call "piano position" or, in fact, any fixed position. Great damage can be done to oneself by enforcing unnatural postures or by exaggerating the holding or rigidity of any part of the body. This is true of any kind of finger pressure. When we press hard, we do not feel more, we just feel bad. Less emotional and physical energy as well as expression pass through a joint when it is made immobile. The point is this: as in life, we are constantly in motion, our thoughts and feelings on the inside and their manifestation, however subtle, on the outside. The effects of gravity and physics and the principles of physiology and body mechanics are in constant operation. We can be comfortable all the time if we make the choice to be so. At the piano as in life, we have huge motions and tiny mo-

tions working together on all levels and in all possible combinations. Often at the keyboard, we have learned, or rather we have imposed, a set of gestures that have nothing to do with expressing the emotions of the music through our own physical and emotional feelings. Eventually, without feeling and aware bodies, we become injured and are finally forced to stop playing.

Once the key action and the corresponding minimal finger action have been experienced both intellectually and physically, the finger action will soon be mastered. Since it is easy and feels natural, it needs little repetition and minimal maintenance. The rest of playing is about expressing, living, and breathing the music through a combination of large and small body movements.

The body itself is a miracle. How do we all learn to walk, to run, to play in the sandbox? Do we take lessons? Of course not. Our "play" muscles are able to do highly complicated tasks successfully on their own without the conscious mind interfering. I distinguish between play muscles and work muscles for musicians only to point out that using the former allows us to feel good and have fun while playing, whereas the latter brings on fatigue and pain. The neurologic patterns necessary for

one to do trills, scales, arpeggios are not consciously learned detail by detail any more than running or jumping is learned point by point. Overall, one is either comfortable or not at an instrument. A healthy body does not choose to walk in a cramped position; a healthy performer retains his flexibility and chooses to avoid cramping. We do not stretch ourselves before normal walking or talking. Likewise, if the body is flexible, aware, and knows what to do, it is ready to perform without a regimen of preparation. There is no doubt about the fact that children are more in touch with their bodies and that their bodies are more limber. Unfortunately, as they grow up and come into contact with diverse influences, their body awareness is often denied in the process of assimilating added and wonderful knowledge. Children's innate sense of themselves falls behind the rest of their development. Again and again, I notice that adults do not become aware of their bodies until something goes wrong. I could not agree more with the premise, practice, and experience of Dalcroze, Alexander, and Feldenkrais that it is important to get and stay in touch with oneself for overall health in order to feel good and move fluently.

When a person decides to use a tool for the duration of his or her life as a vehicle of communication, the most sensible procedure would seem to be to learn the most effective and economical way of using that tool so that one gains access to minimum effort with maximum result. This is what my former teachers, pianist Gyorgy Sebok and cellist Janos Starker, believe. I would say that 75% of my teaching at the present time is devoted to undoing acquired, unnecessary, and altogether strange manipulations of the body. Without hesitation I can say that a great many music teachers teach all about music and how it should sound, but have a very small window as to how the body works, or what the most effective and economical ways are for the body to bring the music out of the instrument in an easy and natural manner. To handle the challenge of limitless sounds on the piano, or any instrument, an exploration of such aspects as speed, height, weight, mass, and gravity is essential. It is the endless combinations of all these areas that create variety in tone, tone color, and variation in touch and texture. Knowing one's body creates limitless vocabularies of musical expressions and sounds from pianissimo to fortissimo.

Many of my students think that hearing a piece inside one's head is a good substitute for practicing. This does tell the performer that he or she knows how the piece goes from beginning to end, but this inner hearing does nothing for physical security. Technical accuracy depends on merging hearing and body language. Practicing the

piano is a creative and total experience. It is a quest for deciding and selecting what one wants to say. It is an act of active imagination. An actor does not learn the mechanics of his language while rehearsing a play. After one knows the basic interactions between one's self and the instrument, one works on the expression and not the technique of each piece, for the latter has already been done.

LEARNING AND MEMORIZATION

This kind of approach to music and music-making is not a method; rather, it is an ongoing process that continues as long as the process of living continues. The kind of synthesis I speak of, which defines and coordinates the images of singer (breathing), dancer (movement), and conductor (timing) within ourselves describes both the process of learning music and the resulting process of remembering music. Memorization, as we use the term today, usually means something different: the student sits down and forces himself or herself to learn a piece by a series of intellectual contortions and procedures. Such a feat is another way of imposing artificial and unnecessary systems onto an otherwise natural process. When we learn, we absorb and observe on all levels at once. Some levels are conscious and some are unconscious. When there is a lack of meaning, feeling, or significance, there is an absent or broken connection between the levels. As a result, the potential for trouble exists.

First, a brief word about sight-reading. This is the ability to read music fluently at sight, like reading aloud. All music starts with the ear, goes through the body, and becomes actualized in sound. The ear is much more important than the sight. Good musicians are people with highly developed ears. In professional performance eyesight is only minimally important, primarily because the hand quite often moves more quickly than the eye. As I have suggested earlier, body language itself measures time in space as necessary. So even in chamber music, visual cues are not always needed. If a group plays together for a long time, they breathe together, feel together, and end up developing a "sixth sense" about one another's timing. Quite often one does better not looking. In fact, the looking may add a needless delay to the physical response.

For most pianists, sight-reading or reading music is a difficult task and is accomplished with more of a struggle than reading English aloud. While musicians already know, for instance, how Schubert's music sounds in general, they do not know the specific aural or physical language of this composer on the piano and how this translates into

an actual physical feeling. They read notes, note by note, rather than feeling groups of notes or phrases. In English this would be letter by letter or syllable by syllable. Many professional pianists cannot sit down and improvise even a little in any style; this is also related to the learning of music. To make an analogy with speaking, the inability to improvise in music is similar to an inability to converse freely without stumbling around for words. The ability to play or to speak necessitates the feelings of aural skills and, on the piano, keyboard skills, too. If these are missing, the ability to hear and then play harmonies in an appropriate sequence does not occur and one must not function except by stuttering at the instrument. One hears (melody, harmony, and rhythm), one feels (physical and emotional motion), and then one is able to play or improvise. The importance of this profound connection between breathing, body language, and emotional meaning cannot be underestimated. If any one of these parts is missing, the pianist will have a disability. The more fused the hearing and feeling, the easier and quicker sight-reading and learning become. As in reading of the written word, it assumes an already extant knowledge of grammar, word order, and sense and in musical language a recognition of harmonic and melodic patterns. The same ideas apply to learning and memory. The significance and awareness of sounds, melody, and rhythm, passing through our physical motions and sensory emotions create a natural and integrated learning process that is at once conscious, unconscious, instinctual, intuitive, and intellectual. If a person can carry a tune, then when he or she is touched by a melody in some way, he or she can sing it back. The emotional experience largely creates the memory. It is easy to translate this sensation into a pleasant physical sensation on an instrument.

Body language has its own memory bank, too, seen in activities like riding a bicycle. When merged with an initial positive emotional experience, such awareness is heightened and memory emerges as a spontaneous by-product. One does not sit down at the piano to remember, one sits down to recreate an experience, or a feeling. Then, the remembering and the recalling of images, whether visual, physical, or aural, takes place. This process automatically uses the imagination.

Let me give you an example out of my own life. I arrived at the Aspen Music Festival at the age of 13 years, much too young, to study with the late Rosinna Lhevinne, now a legendary piano teacher. Prior to this, I had always played music either by ear or from the score. I had no problems with memory. I had perfect pitch, good coordination,

and I just sat down and played. It was the easiest thing in the world. If anything, this was my channel of security and confidence in an otherwise conflicted existence. Suddenly, at Aspen, I found myself in the midst of a class of old people, ranging in age from 20 to 40 years. We had master classes weekly. Inevitably, whoever played had a memory lapse. I had never been exposed to this phenomenon before. It was a new and frightening experience. The big questions, such as how do you know if or when this will happen? what is the climate for such an occurrence? what do you do to prevent this? were not addressed by our teacher. I began questioning my every move, my every instinct, and in a matter of 2 weeks I was unable to play anything from memory. I was so worried that I did not know the music or that I would forget it that I began to derail myself as a matter of course. It worked like precognition in the most negative manner. I began to wonder, too, if I was hearing correctly, and, as a result, I lost the ability to use my ear and my perfect pitch. My innate talents went underground and became inaccessible. It took about 4 years before my inborn talents restored themselves to a functional level so that I could once again begin to have a musical experience for its own sake. But the scars lingered. My musical imagination was traumatized, and it took many more years before I would be able to trust myself enough to once again do things completely by ear. It took just as long for me to understand fully the nature of this experience and how all my instinctual and intuitive processes, all my established positive learning patterns, had been burglarized.

I have spent my life involved in the various aspects of music and music performance; my past has demanded this. My own story has led me to value teaching as, among other things, a wonderful tool leading not only to self-knowledge, but to preventive care as well. In healing and teaching myself I have learned to crawl into my students' bodies and experience their discomfort and pain. I have learned to creep into their ears and feel the missing links in their hearing, their reactions, their coordination, or all of these. I have learned to help them restore music from the heart and to play by ear by contacting their natural gifts, by helping them sing, by helping them form a more complete image about the music they love. I have helped them to know and balance their intellectual and creative sides.

PERFORMANCE ANXIETY

Anyone who performs has to learn to deal with stress and anxiety. Of course, the demands on performers are great, especially on the soloist for

whom the balancing of neurologic and physical functions must be at its highest peak. Many times the anxiety and fears related to performance have their roots in a part of the musician's character structure that has really nothing to do with music or performing. In other words, the anxiety is already there, ready to go. The approaching performance just pulls the trigger. The anxiety is transferred to the coming performance. If the musician were to switch professions, the anxiety would most likely find a new path and make its appearance somewhere else. My experience in this area is along these lines. However, this is not, strictly speaking, performance anxiety, even though, in this kind of case, there are plenty of reasons for anxiety appearing when and as it does.

In general, I find that real performance anxiety problems are successfully treated by approaching music in the way I have discussed. The biggest fears are not about missing a few notes, but are about not being able to play at all or forgetting and having the dreaded memory lapse with no recovery possible. If all motions and emotions are in tune with one another and integrated, one feels good about what one is doing and fully engaged. Butterflies in the stomach or preconcert excitement will be not only normal but a welcomed anticipatory sensation. The concert becomes a high or peak experience and is even looked forward to by the performer.

Several things tend to happen when pianists get nervous. These are some of the typical manifestations: they play faster than intended and the pedal or pedals stay down. These are the two most typical manifestations. What does the performer feel before the concert or while performing? Circulation is impaired so that hands are like ice; breathing is inhibited and shallow; extremities, especially the legs, are stiff. Sometimes knees knock together or there is a slight tremor in the hands or legs, palms perspire, speech gets mixed up, the performer cannot think, the stomach is upset, there is nausea, diarrhea, and even vomiting.

Of course, when one performs, one does not "think" in the usual sense of the term. There is not space enough to do that. What happens is that, in order to give an event or a piece one's best shot, one lets oneself go, not in an emotional sense, but in the sense of letting the body and its intuitive, instinctive awareness take over. This works provided that everything has been truly absorbed by the mind as well as the body on the many levels I have mentioned. In one's identity then, as a performer, one feels that one has a lot to go on; in reality, there is no possibility of forgetting everything because all the systems overlap. As long as I exist, the music in me will exist. My language and

the workings of this language from my ear to my body to sound are a part of my very fiber. Of course, I am talking about human performance and not a performance goal that is to mimic the mechanical perfection of the recording industry. As long as live performance remains a purely human task, one must emotionally and psychologically leave room for human error and see it in a positive light. I hasten to add, too, that, no matter what, performing takes some getting used to. Most of us have to adjust to getting up in front of hundreds or even thousands of people. Again, all the building blocks in the process have to be in place, and one needs to know when and how to switch from practicing to practicing performing, from the practice room to the lesson, from performing at the lesson to performing for one person, from a master class to an informal recital or a small formal recital. This is actually not as difficult as it sounds, because we shift gears all the time in our daily lives as we go from one kind of task or event to another. In the end, performing is interesting and fun. One uses oneself to the fullest and as a result one always learns a tremendous amount about oneself, the music, and sometimes other people (the audience). It is always a growing experience.

EDUCATION AND PREVENTIVE CARE

Without a doubt, one cannot learn to play an instrument from any book, and of course to do anything involving great physical dexterity and skill requires enormous knowledge. Most needed in the area of music and medicine is continuing education for both the musician and physician. I would like to see the development of seminars to which physicians, medical students, music teachers, professional performers, and music students are invited, seminars at which hands-on experience can occur. Perhaps I could facilitate such musician-physician communication by playing all the Chopin Etudes, or another tremendously difficult work, many times over. I am sure I am not alone in my sense that such seminars might be useful or in my offer to help. It is very important for all of us, musicians and physicians, to be wary of teachers who do not themselves perform but who dispense instrumental playing methods. It is very important, too, for physicians to exchange information with performers who play with ease and flexibility and to observe and even to examine such concertizing musicians while they play. There are intricate and complex neurologic and physiologic relationships that can be comprehended only in a

live demonstration situation in order to be experienced and understood.

CONCLUSION

There are additional comments I would like to make: First, not every performer has aches and pains. I, for one, have none and I have colleagues who teach and perform successfully without pain. Second, some people do have an inborn capacity to play and they need very little guidance. This kind of talent is like a physical gift for language. Third, although not everyone gets tendonitis, eventually, everyone gets tired. If one does the same task over and over again for many hours without respite, something nasty will happen. So what kind of person drives himself or herself beyond the state of fatigue? The body is not a machine. It can and does develop a sense about itself as well as a sense about its own damage point. I can feel this in my-

self and with my students. It works like intuitive emotional insight. Also, every performer knows that a good concert starts with getting enough rest the night before. Common sense tells us that we should rest when we get tired. Fourth, for musicians, it is very important to distinguish between tension and overuse. Even the most relaxed and coordinated person has to avoid overuse. We all need to be aware of minimizing tension in our technique; however, there are some expressions that need a lot of tension. What is crucial here is that the point of release be built into the action. Fifth, once a major injury occurs, the body is never quite the same. As a teacher, my goal is to prevent incipient injuries before they occur.

Finally, I think that to play an instrument well means to respect the body and the soul, and to stay within the normal biologic limitations of the motor units and ligaments. It is the feeling of the finite, after all, that creates the infinite.