Special Section

ArtScience: The Essential Connection

Guest Editor: Robert Root-Bernstein

This Leonardo special project explores the work and writings of artistic scientists who find their art avocation valuable; scientifically literate artists who draw problems, materials, techniques or processes from the sciences; or others interested in such interactions.

Call for Papers

What is the value of artistic practices, techniques, inventions, aesthetics and knowledge for the working scientist? What is the value of scientific practices, techniques, inventions, aesthetics and knowledge for the artist? When does art become science and science, art? Or are these categories useless at their boundaries and intersections?

Can an individual excel at both science and art, or is even a passing familiarity with one sufficient to influence the other significantly? Do the arts ever contribute significantly to scientific progress? Where will current scientific innovations lead the arts in the next few decades?

Submissions exploring these questions can be from artistic scientists who find their art avocation valuable; from scientist-artist collaborators who can demonstrate a scientific or artistic innovation; from scientifically literate artists who draw problems, materials, techniques or processes from the sciences; or from historians of art or science looking at past examples of such interactions.

Interested authors are invited to send proposals, queries and/or manuscripts to the Leonardo editorial office: Leonardo, 211 Sutter St., Ste. 501, San Francisco, CA 94108, U.S.A. E-mail: <isast@leonardo.info>.
Leonardo Book Series

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The arts, sciences and technology are experiencing a period of profound change. Explosive challenges to the institutions and practices of engineering, art-making and scientific research raise urgent questions of ethics, craft and care for the planet and its inhabitants. Unforeseen forms of beauty and understanding are possible, but so too are unexpected risks and threats. A newly global connectivity creates new arenas for interaction between science, art and technology, but also creates the preconditions for global crises. The Leonardo Book Series, published by The MIT Press, aims to consider these opportunities, changes and challenges in books that are both timely and of enduring value.

Leonardo Books provide a public forum for research and debate; they contribute to the archive of art-sci-ence-technology interactions; they contribute to understandings of emergent historical processes; and they point toward future practices in creativity, research, scholarship and enterprise.

Proposals that address these challenges in terms of theory, research and practice, education, historical scholarship, discipline summaries and experimental texts will be considered. Single-authored books are particularly encouraged.

When submitting a proposal, bear in mind that we need to know as much as possible about the scope of your book, its intended audience and how best to bring the book to the attention of that audience. We need to be convinced that the material is important and that you can communicate clearly and precisely in ways your audience will appreciate.

Proposals should include (1) a prospectus describing the book, (2) a detailed table of contents, (3) two to four sample chapters, and (4) an up-to-date résumé/curriculum vitae for the author.

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Composing Music and the Science of the Heart: How to Serve Two Masters

Richard J. Bing

The creative impulse brings to life works of art and of science. Most of us are born with this incentive. Children are creative and wish to share their accomplishments with others. As we get older, many of us lose our creative impulses. The urge has passed and we are happy just to drift along. But in some of us, the compulsion to create persists. It can become an obsession, and when it remains unrewarded and unappreciated, it can lead to a life of bitterness and disappointment. Creativity can produce nothing of significance, or it can result in masterpieces. Here I tell of the joys and troubles I encountered when, as a composer, I felt the impulse to create music and as a physician to explore the workings of the human heart.

As a child, I first explored the relationship of sounds and chords. Later, in a burst of youthful fervor, I improvised on the piano. I was not yet interested or able to catch the wild notes on paper, like imprisoning songbirds. Two hundred years ago improvisation was an important part of a composer’s bag; most of today’s composers do not know how to improvise. Improvisation is the purest form of musical creation, arising from the cauldron of imagination, unpolished by intellectual processes. It is an immediate translation of emotions into tones, with the piano as the willing intermediary. For me, as a child, improvisation was a relief to escape from the onerous task of doing finger exercises, learning to play a difficult piece or finishing my homework. I was able to do so because in my parents’ home, the piano was located in a separate room, the Music Room. Unfortunately, now most pianos are placed in the living room and thus are degraded to being part of the furniture. Their tops are loaded with family pictures and memorabilia. When you see such a pitiful instrument, you know that it stands there as a mere decoration, like a donkey dressed up in gaudy ribbons. The piano, which should be an instrument of exalted music, has become a decoration, unable to be a partner in the creative processes because of the turbulence and noise of family life. But in the Music Room, I could speak to the piano, which became an accomplice and friend. There was no need to commit these wild sounds to paper because I only wanted immediate expression. My conversations with the piano were my secrets. My path to epiphany usually began by forcefully striking a base key while using the pedal. Holding down keys and pedals, I listened with awe to the emerging overtones appearing one after the other until at the end they coalesced in a wondrous unison. Each improvisation had its own character, similar to a movement of a sonata. It also had a coda, usually fading chords, again with their mysterious overtones.

When older, I wanted to communicate, to let others in on my musical secrets, and thus came the tedious and difficult process of putting music to paper. To do so, I had to learn to husband my emotions, reigning them in and organizing them. At the beginning this was difficult, because it was hard to synchronize my musical thoughts with the snail’s pace of the pen. Harmonics, rhythm and coherence also gave me trouble. But my main concern was the use of dissonances. When tonal music first became atonal, it sounded wrong. But with the advent of atonality, a dissonance could be just right, it could be even attractive! If dissonance sound logical in the context of a work, then all is well. There are composers who can identify correctly every note in a dissonant chord no matter how complex. Others have to try out chords on the piano before they approve them on paper. This is the burden and privilege of composers who grew up at the twilight of tonality.

In order to acquire a style of his own, a composer must create a work that reflects his own self. There has always been an abundance of pale, vapid music, and in the long run it is not the tone clusters, the orchestral gimmicks, the cute little turns and twists that make for great music, but the musical reflection of a composer’s emotional life.

I have found it helpful to write music to a specific text. Writing the liturgical text is inspiring. Long ago, I wrote the music to the Latin Requiem Mass for orchestra and chorus. I made many mistakes, particularly those of depriving the voices of orchestral support. I sent the score to Carl Orff, the composer of Carmina Burana, who invited me to visit him in Bavaria. It was
one of several visits. I learned from him that music should have definite character and pattern. Several years later, I wrote the “Missa,” again for chorus and full orchestra. It was performed in the church of Saint Stefan in Vienna, by a wonderful group of artists. This day was the highlight of my musical life.

Music was and is my profession. I always gave priority to medicine. Although I treated patients, my main interest was diseases of the heart and their cure through research. This is a full-time occupation, and the competition is keen. But there is also the wondrous and satisfying search to find mechanisms and cures for diseases that plague mankind. Unfortunately, there are many vicissitudes, such as getting the necessary funding and the usual political backbiting. Why would anyone choose such a thorny road? Because the search for nature’s secrets and the glory of success are bewitching. The impulse to go to the laboratory and work day and night for these goals is overpowering. As compared to composing music, the path of medical research is like a slow-motion film, sometimes little progress for weeks, days of experimentation that may lead to nothing. My search for the nutrition of the human heart, which had implications for the understanding of disease of the heart, took years. What foodstuff does the human heart use? I first had to spend years perfecting the use of the cardiac catheter, at that time a new tool. Then I found out by chance that I could put at will this little plastic hose into the vein that drains the human heart muscle. Most clinical cardiologists considered me a wild man doing such outlandish things and I even had to change jobs in order to follow my new ideas. All this took years of continuous battles to overcome obstacles. But despite all that, it was worth it!

This search for success in cardiac research was at times wearing. It was then that I again sought refuge in composing music. It was a refreshing change, like traveling to a new and exciting country; I felt renewed. Writing music and doing medical research have a common denominator: the creative impulse. Therefore, those of us who are blessed and cursed with this creative urge are motivated to venture in different directions. Writing music is my hobby, being a physician and scientist is my profession. Both are challenges that make life an exciting adventure.

And so I have been busy during my 98 years of life. I have discovered that creative activity gives pleasure and a meaningful life.

Richard J. Bing, M.D., has received honorary degrees in Humane Letters and Science from Johns Hopkins University, the University of Düsseldorf, and from the University of Bologna. He is an Honorary Life Member of the International Society of Heart Research and a recipient of the Alexander von Humboldt Foundation Senior Fellowship Award. He has received a Research Achievement Award from the American Heart Association, the Distinguished Scientist Award from American College of Cardiology, and the Great Order of Merit from the Federal Republic of Germany. He also was chosen to deliver the Harvey Society Lecture in New York, awarded the Claude Bernard Medal from the University of Montreal, and elected to the American Philosophical Society in 1994.