

confirmed by five compelling determinants: (i) provision of prosthesis retention and stability; (ii) retardation of bone resorption; (iii) minimal treatment outcome morbidity; (iv) economic benefits for specific treatment protocols; and (v) enrichment of patients' life quality. Admittedly, very few clinical implant studies fall into the upper tier of a traditional evidence-based hierarchy. Randomized control studies are particularly difficult to conduct, given the required heterogeneity of the starting point, the frequent complexity of the outcome, as well as the long time scale required. Furthermore, it seems unconscionable to deny implant treatment to patients diagnosed as prosthetically maladaptive when well-documented clinical experience strongly endorses the technique's predictable outcome. Hence, the importance of using scrupulously documented prospective studies with clearly articulated patient inclusion and exclusion criteria plus rigorous and standardized outcome measures as a basis for making informed clinical decisions.

Harold Preiskel's championing of the merits of the expanded overdenture technique was just one of his many important contributions to international prosthodontics. He has also been an outstanding clinical academic who has helped train and nurture numerous national and international graduate students who were privileged to study with him and his colleagues at

Guy's Hospital at the University of London. A confirmed internationalist, he played a pivotal role in the founding of the International College of Prosthodontists. He found many willing colleagues who shared his dream of an international forum for the discipline in the 70s, notably Peter Schärer and Jack Preston. However, it was Harold Preiskel's vision, courage, and single-mindedness that eventually catalyzed the ICP's formation. His intellectual curiosity and burning sense of right and wrong contributed enormously to the College's development, as reflected in its high-calibre biennial meetings and the quality of this journal. He has been one of the most respected lecturers on the international scene, much sought-after and very much involved in organized prosthodontics; but he remains above all else a loving and exemplary family man. He is highly cultured, eclectic in his literary and musical tastes, and a very fine pianist indeed. I thought it appropriate to append this essay by the Nobel Laureate John Polanyi at my university, as a collective IJP thank you to Harold Preiskel for his invaluable leadership.

I am confident that his many international friends and colleagues will want to join me in wishing him and his family much happiness and good health as he now changes direction in a long and distinguished professional journey. L' chaim!

#### Peaceable kingdoms of science and music

Science and music have a common aim, which is to make sense of our existence. Each in its own language draws on the culture of the age, which is the sum of human knowledge. It follows that each signals to the other through the mosaic of contemporary understanding.

The natural world inspires experimental science directly, music indirectly. Yet the number of musical notes is restricted by nature. The arrangement of these notes into patterns must fit within the framework of Creation, which also dictates the symmetries of science.

Since neither music nor science are arbitrary, both being part of the God-given world, they reappear in the structure of the cosmos and the atomic nucleus. Early astronomers vaulted from physics into music, authenticating their planetary models through harmony; the so-called "music of the spheres."

Don't think those times are past. Werner Heisenberg, he of the uncertainty principle and the play *Copenhagen*, remarked famously that it was more important that his equations be beautiful than that they fit the facts.

This puzzles people, but it shouldn't. Beauty is forever. Facts have a way of proving to be wrong.

There are, of course, dangers in these professional flights of fancy. Our *jeu d'esprit* must ultimately be disciplined into science that works, and music that is valid. How is this done?

The communities of science and music police themselves. Not every collision of notes can be allowed into Roy Thomson Hall, nor every broth of algebraic symbols see print in Science. New ideas must be tested against standards of beauty and truth. The responsibility for this devolves, ultimately, on the reigning monarchs of the two professions.

This is not a hereditary monarchy, nor is it formally elected. Leadership in science and music is accorded temporarily, and consensually.

What we have here are two human societies, both of a profoundly competitive nature, agreeing on procedures for distinguishing success from failure, rewarding the former and denying rewards to the latter while having little or no formal governmental structure with which to do so; no written laws, no visible police, no robed judges (unless you include evening dress) and no punishment cells. Here are societies with goals so deeply felt and so widely accepted that internal peace can be maintained without resort to violence.

These, for all their injustices and contentions, are the Utopias that music and science offer. These peaceable kingdoms are

the greatest gifts that our professions hold out to the world in its pursuit of peace.

It may be objected that we preserve peace within our communities only by having within them shared goals, a common citizenship of music or of science. True. But have I not then assumed too much in supposing that the citizens of the land of music, seemingly ruled by passion, will forever tolerate the foreign ways of science? Is there destined to be a clash between the two?

Or does there exist an all-embracing culture, on which peace can be based? I believe there does.

It was the Romantics, with their celebration of the irrational—which gave us such dubious treats as nationalism and patriotism—who insisted that music speaks to the soul, whereas science addresses the mind. Some here may nod assent to this proposition. On reflection, they should not. For there are not two cultures, but one.

I would call Maestro Helmuth Rilling as the first witness for my case. He treats music as a rational construct when, as he frequently does, he explores the structure and architecture of Bach's cantatas.

The Church of Rome has, on numerous occasions, paid science the opposite compliment of regarding it as having a message for the soul, when it has objected on doctrinal grounds to new scientific findings.

Nor is this interplay between mind and spirit incidental. "The mysterious," Albert Einstein remarked, "is the source of all art and science." This is hardly surprising, since all that is unknown is mysterious.

Clues to the mysterious come to us in part through what we loosely call "feelings," and in part from what we loosely call "facts." We express them in languages such as music and science. If these languages did not translate, there would be no such thing as "a culture."

"When I hear the word culture," Hermann Goering is supposed to have remarked, "I reach for my gun." We should take comfort in the fact that the meaning of culture is clear, at least, to barbarians.

Never again, one must hope, will there be a movement that attempts to cleave our culture in two, separating mind and soul. It was this separation that permitted civilized people to act pitilessly at intervals throughout the last century.

The compelling nature of one pseudo-scientific ideology after another gave them license, they thought, to trample on the face of humanity. This is how it came about that Beethoven played as background music to the experiments of Mengele.

Science and music have an obligation to listen to one another. Happily the schism between mind and spirit is less at present, though it continues. What choirs, one wonders, today sing hymns to intolerance and terror?

Yet every church at some time in its history has forgotten its humanity. In future none can be allowed to do so. The ex-

cuse of ignorance has grown too thin, and the dangers from barbarism too great.

Today music when it incites to war, and science when it paves the way for killing, can lead to disasters greater than history has known. Sadly, there is nothing in the language of music or science to ensure that they speak only for what is humane. Both can be destructive. But there is, as I have said, a great deal in the practice of these professions that proclaims civilized values.

Both give evidence of that most humane of qualities, human fallibility. We celebrate the greatest of explorers, whether Bach or Einstein, without going so far as to deify them. They too remained learners, as they acknowledged, to the end of their days. We are all, in addition, mortal. Even our species.

The sun is a fusion reactor, a blazing hydrogen bomb consuming 700 billion tons of its limited store of hydrogen every day. "Some say the world will end in fire," wrote Robert Frost, "Some say in ice." The best scientific thinking is that fire will come first, to be followed by ice.

But what is the message for the soul in this particular finding of science? Does it even matter if life ends, and the rocks boil?

Bach, in his contemplation of the Day of Judgment, seemed to think it did. So does every human being whose thoughts reach beyond the day of death. And that encompasses most of humankind. We strive to leave a legacy in which those who follow can take pride.

Since time is not a consideration for the dead, one is entitled to ask to what ultimate audience this behaviour is directed, and from what faith it flows. We are unlikely to get a more persuasive answer than Bach's at the close of *Cantata 105*, composed for the Thomaskirche's service of July 18, 1723.

We are borne along, he has the choir sing, by the belief,

"That in all these earthly reaches

No one shall be lost forever,

But instead have life eternal,

If he but with faith be full."

Or, in the original words,

"*Dass auf dieser weiten Erden*

*Keiner soll verloren werden,*

*Sondern ewig leben soll,*

*Wenn er nur ist Glaubens voll."*

The last line, speaking of life eternal, reads, verbatim; "If he but with faith is full." But that is not unusual. Every scientific proposition and every musical composition is aimed at eternity. What is true we believe will outlive the sun.

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*The author of this essay, John Polanyi, is a Nobel laureate and member of the Department of Chemistry at the University of Toronto.*

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