

## Tuning and Register as Policy Issues

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*The following paper, written in January 1988, played a key role in the process of organizing for the historic Schiller Institute conference of April 9, 1988 in Milan which began the campaign to lower the standard pitch to A=432 Hz (C=256 Hz). It has since been published, in German translation, in **Ibykus** magazine, and in Italian in **Il Machiavellico** magazine. It is printed here for the first time in full in English.*

The case to be made starts from elementary sorts of empirical fact.

We start with the practical fact of bel canto methods of training and use of the singing voice, that the quality and preservation of the singing voice requires strict respect for predetermined voice-registration for each voice. This is illustrated by the fact, that for the soprano voice, using the C=256 well-tempered scale of Mozart, Beethoven, *et al.*, the relevant point of register-passage lies between the F and F-sharp, or below F on an equal-tempered scale set at A=440. The attempt to set tuning at higher tunings is destructive of both the performance and shortens the life of the singing voice.

The upward shift, from a well-tempered C=256, to an equal-tempered A=440, is already a problem. This compels the soprano to shift on the F, rather than the F-sharp, which creates a problem of musical interpretation for those portions of the classical repertoire written for shift on F-sharp.

Singers indicate that the elevation to A=440 also tends to create vocal problems; although I do not think myself qualified to offer firm conclusions on this, I find the report a credible one, one which merits more discussion and documentation.

The tendency has been to train sopranos to shift on the F of A=440, rather than the F-sharp of C=256. This introduces problems of interpretation of some classical repertoire, but is indicated to be a manageable sort of accommodation from the standpoint of the trained voice as such. It is the tendency to shift upward to A=444 and beyond, which is indicated to be disastrous for both singing voices and interpretation.

On those points, I believe we are all more or less agreed. I think we are also united to the purpose of identifying the proper registrations of each quality of singing voice relative to reference tunings of well-tempered C=256 and A=440, and the importance of a strict standard of practice for the purpose of defending both musical interpretation and the *bel canto* quality of singing voice.

I believe we might also agree, that the specification of such standards should be enriched by clarifying review of the characteristic problems encountered wherever deviations from such standards are introduced.

There are three broader implications of that central point:

- 1) The proper tuning and other characteristics of musical instruments, with the included presumption that classical composition, prior to changes in instrumental designs occurring over the 1815–49 period and later, aimed to achieve coincidence with the requirements of what we came to term later the *bel canto* voice.
- 2) The bearing of singing-voice register upon the principles of counterpoint in classical composition, including the bearing of this upon performance of classical works, from Bach, through Mozart, Beethoven, *et al.*, through Brahms. This includes the way in which classical composers employed register shifts in composing songs.
- 3) The matter of the basis for these principles of tuning and counterpoint in both physics and biophysics.

My own approach to all of these topics has been from the standpoint of the fourth topical area.

If we employ the treatments supplied by Johannes Kepler in light of the more advanced standpoint of nineteenth-century physicists such as Carl Gauss and Bernhard Riemann, we show both that the natural musical scale is the well-tempered one, and that the principle of singing-voice registration, as demonstrated empirically by *bel canto* practice, is inherent in the natural, Kepler-Gauss-Riemann construction of the well-tempered scale. I.e., the asteroid belt, as determined by reconstruction of Kepler's specifications for this, is the location within which the soprano register-shift occurs.

This poses the question: How does it occur, that the natural potentialities of a properly trained human singing voice coincide with the values for register-shift intrinsic to such a Keplerian construction of the well-tempered scale as the only natural musical scale?

The appropriateness of applying Kepler's method to biological processes was emphasized by Kepler himself, who based his work to this effect on the discoveries effected at Milan by Fra Luca Pacioli, Leonardo da Vinci, and their immediate collaborators. All living processes have the same harmonic characteristics of ordering which underlie both the well-tempered musical scale and the Kepler-Gauss-Riemann laws of astrophysics. Modern optical biophysics, especially empirical work in the field of nonlinear (electromagnetic) spectroscopy of the cell and subcellular processes, shows this connection in a new light.

In short, taking into account all the considerations, including the electromagnetic characteristics of propagation of sound, it is a law of nature that the singing characteristics of the human voice should be as *bel canto* discipline exhibits the relevant phenomena.

The most natural thing is that what we term today *bel canto* discipline should have shaped the development of both the design of classical musical instruments and the principles of vocal and instrumental polyphony. Sculpture from the fifteenth century assures us that *bel canto* methods were in general use in relevant parts of Italy, and doubtless the Netherlands, during that century. What else but the *bel canto* singing voice's use for the singing of classical poetry, provides man the standpoint of reference from which to perfect the all-sided development of music? What else could guide us properly in the matter of design of musical instruments, or in elaborating principles of composition of polyphony?

Another leading consideration in the development of classical musical composition, is the influence of what were called Augustinian principles of harmonics in art generally, including the cathedral designs of the builders of Chartres and music. The Golden Renaissance, most emphatically during the Milan period of Leonardo da Vinci's work, reexamined more or less exhaustively the principles of aesthetics adopted by the classical Athenians, for whom the harmonic orderings associated with the Golden Section was the metric of beauty of form.

The healthy morphology of all living processes' patterns of growth and function is harmonically congruent with the Golden Section. So, since all life is beautiful, a production in art which does no more than simply imitate such natural beauty, is an important classroom exercise for the training of artists, but this achievement does not suffice to define art.

Art must be defined as that which is consistently faithful to the principles of natural beauty, but which adds something uniquely human. It is on this point that my approach to art, over the past 40 years, has been shaped. The results of that line of inquiry lead me not to contradict what singers report on tuning and voice-register, but rather to show that the issues involved are more profound, of greater urgency for mankind, than might be suspected if this were seen as a matter confined to the domain of singing.

### ***Two Crucial Points***

My specific contributions bearing upon aesthetics have been two. First, out of my work on the intelligible representation of creative mental activity in the physical sciences, I have been enabled to show the nature of that creative mental activity which distinguishes an artistic musical composition, for example, from an imitation of natural beauty. I have also been able to demonstrate, that creative mental activity of that sort is associated with a very specific quality of emotion, coincident with the New Testament significance of the Hellenic *agapē* or Latin *caritas*, and more simply identified as the emotion of “tears of joy,” as distinct from, and opposite to the “erotic” impulse of unbridled romanticism.

If we employ the mathematical physics of Gauss and Riemann in an appropriate way, we are able to supply a rigorous form of intelligible representation of creative mental activity as this applies to valid fundamental discoveries in the physical sciences, and applies also to creativity in classical musical compositions of Bach, Mozart, Beethoven, *et al.* By examining counterpoint from this vantage-point, we are able to show how creativity is explicitly represented in such compositions, and how the registral characteristics of vocal polyphony function within the well-tempered domain provide the ground upon which creative activity works.

It happens, that creative mental processes have the same characteristic we associate with the classical harmonics of natural beauty. Thus, beauty, so defined, so superimposed upon natural beauty, is the proper elementary requirement of art.

The qualities of the properly trained singing voice are a form of natural beauty. The classical instruments are properly designed to imitate the quality of beauty of such a singing voice. Interpretation of a classical composition flows from this. One must grasp the way in which the composer’s creative faculties have imposed a development upon the composition; that characteristic feature of the unifying developmental process becomes the idea of the composition as a whole.

However, this idea is set within certain conventions. The first set of conventions are those pertaining to natural beauty as the registration and well-tempered ordering of the singing voice defines this. The second set of conventions is associated with the principles of classical poetry, in which the classical composers were steeped. Within insight into the creative conception defining the composition as a whole, and by adherence to those conventions of the classical musical domain, an effective interpretation in performance follows, with lesser or relatively greater degree of perfection.

Music is thus enabled to partake of all of the non-plastic arts. It is immediately poetry. Polyphony and poetry embed naturally in music the qualities of classical dramatic tragedy.

Since classical musical composition's situating of the creative processes of mind in a context of natural beauty evokes naturally the sense of *agapē*, the natural emotion of great musical performance is always akin to "tears of joy." Hence, classical musical performance is a sacred, spiritual matter, whether the setting is a religious or secular one. It celebrates and affirms both human creativity and *agapē* in a unified way. It nourishes the soul, strengthens it, brings moments of beauty into a world filled with uglinesses, and evokes among audiences that emotion best suited for fostering social relationships consistent with agapic love for mankind.

There are few instruments so noble, so effective, to reach into the aching mass of humanity, as to teach children to sing by emphasis on *bel canto* methods, and by introducing to them as they are able participation in some aspects of the great classical musical repertoire. Great poetry, great classical tragedy, and music, are the great companions of a daily effort to uplift the spirits of men and women, and children most emphatically.

We have seen parents of children from families themselves in most reduced circumstances, watching and listening as their children sing in choruses working in such directions. We have seen often enough the approximations and outright expressions of tears of joy from those parents. Seeing this, we know what a precious thing it is we defend, when we work for the defense of sound principles of *bel canto*, and for the conditions under which those principles are preserved.

If we situate the requirements of the *bel canto* singing voice so, the larger importance of the issue, to all people, as well as to singers, is posed to us. The participation in beauty made intelligible to performers and audiences, is one of the means by which our imperiled civilization might be rescued from the doom toward which it seems to be proceeding.

On that account, I propose that while we defend what the empirics of *bel canto* singing show us must be defended, we also reflect upon the more profound implications of that which we defend. It was the classical movement in painting, architecture, poetry, drama, and music which contributed so much to the best which our civilization achieved in the past; we need those qualities, almost desperately, to preserve that which we appear to be on the verge of losing altogether.