THE VIOLIN PLAYER

I am about to watch a young girl play the violin.

She is my daughter.

I observe as only a father can, indulgent, yet detached.

A quarter-sized violin is tucked under her chin, with the tip of the bow resting on the strings, poised to begin the music.

The audience becomes quiet. She is ready to play.

As she begins the music,

I notice her clothing, observing each detail: the fabrics, the colors and shapes, the materials and textures. I consider the costume in relation to the context of the performance, as well as to the style of concert dress in general. The formal relationships, as well as the cultural references are played-out in my mind.

As I continue to observe my daughter,

I imagine the effects of the various organs, muscles, and cells working together throughout her body to achieve the complicated activity of performing. Each special function must do its job to coordinate the range of skills and activities necessary to accommodate the demands of performance.

Which groups of cells respond to the physiological and psychological aspects of nervousness? What are the processes that monitor feedback and error-correcting throughout the performance? What functions are responsible for stabilizing heartbeat and breathing? As the performance ebbs and flows, how are the various emotional cascades and intensities controlled and modified throughout the body?

What are the brain functions that allow the player to construct or reconstruct a model of the music in real-time? What role does memory play in the making or remaking of the music? Is all music and its performance a simulation of some other state or series of events, or is music a separate system of abstract sounds and symbols complete within itself. Perhaps it is a combination of both?

The functions of the brain control changes in human behavior. And the brain itself is controlled by internal and external factors of various kinds. The variety and flexibility of the cells which form the network of interconnections within the human brain make it possible to store and process information in a variety of ways.

Conscious and unconscious patterns of information which are processed in the brain may be extremely useful under conditions of stress such as performing in public, while other information may be unavailable, irretrievable, or so abstract that we find no use for it whatever under such conditions.

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As I listen carefully to the music, I am reminded of its beginnings:

When did music originate, and where? Was music sung before it was played, or vice versa? When was music written down for the first time? When was it first recorded, and in what form?

Where did the first musical group congregate? Was there always melody, rhythm, and harmony? Are these simple musical elements fundamentally arbitrary and trivial? Or are these advanced, more specialized functions of larger fundamental patterns involved with time, motion, and spatial relationships?

How did the evolution of notation develop? What about the development of various musical systems and languages throughout the world? What *exactly* distinguishes two different musical styles or genres? What determines musical taste?

If there are evolving creatures in other planetary systems in our galaxy or in other galaxies, what kinds of musical structures, forms, ideas, and notational schemes have been developed?

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Again, I stare up at my daughter, amazed at her concentration and flexibility as a performer. I can only wonder at the variety of influences impacting her performance.

For example, what is the origin of the instinct that causes a player to slow down at the end of a phrase? Is this expressive instinct biological, cultural, or psychological? Or is it strictly a linguistic based impulse, mimicking certain patterns of speech or language? Do all musicians in all cultures do this?

Why for many, do endings seem more difficult to execute than beginnings? Why does it seem easier to play 'down' the scale on the piano, than to play 'up' the scale? Is it psychological, based on our knowledge of gravity. Or is it because of the way the thumb functions on the keyboard?

How do you achieve perfect timing or optimum tone-control within the context of the music? What is it about holding an instrument next to the body that makes it so difficult for a performer to relax while playing?

What is the relationship between listening to music and playing music? Do the best listeners make the best players? Or vice-versa? Is the relationship between playing and listening confusing for the player, or does it inform the player.

What exactly is musicianship?

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As I listen to the sounds of the violin, I can visualize the acoustic properties of the instrument.

In my mind, I follow the elliptical path made by the vibrations of each string as they travel from one end of the violin to the other. I visualize the vibration patterns that form geometric configurations on the top and bottom surfaces of the instrument.

Each part of the violin acts as a vibrating sound source that transmits sound waves into the surrounding air, where they travel outward in all directions, filling the space.

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How is the acoustic information transmitted through the air from one place to another?

In general, sounds that occur within the threshold of human hearing are generated by a source that causes the sympathetic vibration of molecules in the air. The sound source causes the normally random molecules to vibrate forward and backward, producing collisions that create the propagation of sound waves through the air. The uniform vibration of the molecules produces a wavefront that travels outward in all directions from the center of the source at the speed of sound.

The acoustic information that is generated by the violin, the *frequency*, *intensity* and *sound quality*, is contained in the vibrating motion of the sound wave as it travels through the air. Under normal conditions, the acoustic information contained in the sound wave is preserved over distances long enough for the sound to be detected by the ear and transmitted to the brain.

As the sound of the violin is reflected from the various walls and obstacles, it resonates, echoing throughout the hall. A natural reverberation is created as the waves of sound produced by the violin strike the walls and objects. Overall, the reverberation has a decay time that is proportional to the dimensions of the space, and the force applied to the violin.

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I listen closely for the reverberating echoes produced by the violin, trying to measure their decay times. I look up at my daughter, reflecting on the past, on the cultural history of the violin and its place in music.

I think of the great master Italian violin makers: Stradivari, Guarnari, Amati. As well as the expert French and German bow and instrument makers.

I am mindful of the rich tradition of violin playing, of the direct descendants of Eurotraditional performance: the gypsy violin music and musicians of Central Europe, Irish fiddle music, and its legacy of inspired American fiddlers and fiddle tunes. As well as the diversity of ethnic and traditional bowed and plucked string music and performers of the world.

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As the sounds of the violin continue to resonate throughout the hall, and those within it, I am curious about how sound is processed in the body, what happens to the sound as it reaches my ear and brain, eventually filling my head with music.

What is the relationship between music and sound; between the ear and the brain? At what point are sound waves that originate in air identified in the human brain as musical perceptions?

What does the *ear* do with these sounds? Exactly how does the *brain* convert sound waves into music?

The human ear transmits sound information to the brain, where it is processed as auditory information. Sound information that is contained in the vibrating motion of the air is collected by the ear, then channeled to the brain where the sound is transformed into perceptual events.

The visible part of our ears, working together, produce binaural or stereo hearing, which allows us to detect the direction or directions from which the sound is approaching.

The *outer and middle ear*, collectively, amplify the normally weak sounds of the air in order to move the heavy fluid of the inner ear. While the *inner ear* is responsible for separating each sound into its constituent vibrations, which are then transmitted to the auditory regions of the brain and processed as sound perceptions.

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But how and when, exactly, does the sound become music?

At the highest levels of organization, the brain represents sound information as musical information. The brain abstracts sound information that it receives from the ear, modifying it through various processes and functions. And it is these processes which form the relationships that create our musical perceptions.

For example, the brain converts time events, such as the frequency rate at which molecules vibrate in a sound wave, to spatial events, such as tones that are perceived in the brain as having a high or low pitch. While the intensity, or magnitude of the sounds are perceived in the brain as loud or soft, or as having spatial depth. The louder the sound, the closer it appears to be to the listener, and the softer the sound, the farther away.

Although much is known about the way in which sound is transmitted and modified within the human ear and brain, it is completely unknown how the brain converts sound information into musical perceptions within the cortex of the brain. It is a remarkable achievement of biological evolution that the brain is capable of changing acoustical information into musical perceptions.

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There is a subtle transition in the music. Someone coughs. Others shuffle their feet on the floor, or shift position in their seat.

I think of John Cage's *Cheap Imitation* for solo violin, of the Paganini *Caprices*, the Biber Sonatas, of Tartini and the *'Devil's Trill'* Sonata. The *Unaccompanied Suites* of Bach. The solo Sonatas of Ysaÿe. The wealth of twentieth-century solo violin music. The many generations of Italian violin composers, players and teachers evolved from the single influence of Corelli. The role of the violin in the development of Orchestral and Chamber Music promoted by Lully and Haydn. The Sonata music for Violin and Piano, or in Mozart's case, for Piano and Violin. The Romantic Concertos. The Encore Music of Kreisler and others. The Belgian and Russian schools of Violin Playing. The great catalog of Technical Studies. The legendary Conservatory Training.

The evolution and development of the violin, its makers, and the history of its music, are ultimately interrelated, and mutually traceable.

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Music itself is a model, a representation of some other system or state of activity. Like mathematics, it is an abstract medium that, in its essential form, represents or simulates an idea or concept, or a series of events.

For example, a musical passage may be based on an abstract sequence such as a number set, a philosophical concern such as a paradox, or a complex psychological state involving an internal contradiction.

Music models physical events all around us, ranging from human thoughts and feelings to atomic interactions and astronomical happenings. Music simulates natural rhythms, speeds, and durations of all kinds. It models beginnings and endings. It refers to colors and intensities of varying degrees. A piece of music may have a characteristic identity or quality. And music

refers to spatial dimensions through the use of pitch, dynamics, and the number and position of active sound sources.

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Music simulates *change* in the world through structural variation and form.

Variation and change occurs at every order of magnitude and scale in the universe, from the largest objects and events to the smallest. And these include the full catalog of transitions, in which events change into other events in different ways and at different rates, depending on the event.

We observe that there are one-hundred or so basic elements, and four elementary forces, and three of the four forces are probably variations of a single fundamental force. All material objects and events are variations or re-formations of these basic material elements, whose structure and behavior is entirely shaped and determined by one or more of these forces.

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Music represents *relationships* of every kind. Music simulates repetition and cyclical events in nature, as well as linear and incremental events. It models order and disorder, continuity and discontinuity, spontaneity and deliberation, and a variety of material textures and densities.

A single piece of music may contain the local characteristics of its culture, as well as the general principles of the universe of which it is a part. In general, music contains the conscious and unconscious concerns and passions of its creator, or its interpreter, or both.

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As I listen to the music, I am drawn to the relationships that determine its form and structure. At the same time, I am intrigued by the listening process itself.

How do we listen? Is it really impossible to fully understand or experience something on the first hearing? Should we use our imagination to make quick-edits or large-scale structural changes as we listen to something new? Do we listen to speech and music in the same way? Is it easier to listen to music in the dark?

Musical perception relies to a significant degree on memory, and on making broad and detailed comparisons. During the listening process, we compare current sounds with previous sounds as a means of recognizing and appreciating the structure and content of the music.

One way of doing this is by historical referencing, in which we compare what is being heard against all known or familiar music. Another way involves perceiving music according to the *context* in which it occurs, by recognizing the relationships that exist between and within the various parts of the music. Yet another way is to pay attention to the *language* in which the music is presented. The language of music, like other languages, is defined by its syntax, and is extended and elaborated by its particular use.

In general, the process of listening requires a variety of skills. A skilled listener must be able to focus on the details of what is being heard, and at the same time experience the general flow and structure of the music as a whole, without imposing preconditions on the music or lapsing into a kind of 'sound-bathing' experience. This is accomplished by alternating one's focus of attention between the many *details that comprise the music*, its *larger structures and substructures*, and the *overall effect on the senses*. The alternation of focus of these three elements may occur in any order, but must occur at periodic intervals throughout the progress of the music in order to achieve the most comprehensive listening experience.

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As the music increasingly demands more of the audience, I begin to experience the full effects of its power.

Since music simulates time and space, when we listen to music we are exploring time and space in a different context, in a more concentrated environment, a kind of virtual space-time, removed from our normal experience of events.

Like other forms of art, such as dance, theater, video, film, kinetic art, and other performance media, *music* is time-dependent. It relies on a sequence of events to represent its meaning. The meaning of music, of both its structure and content, is *accumulated* as an increasing number of musical events unfold in time. For the performer, timing becomes a critical tool in which to reveal musical meaning.

But what of Time itself? What is essential about the way in which events occur in time, or about our perceptions of those events?

Events consist of a combination of incremental steps. In most cases, we cannot apprehend events in their present state quickly enough to make use of the information. Through a process of evolution, we have devised an ingenious set of functions that we call memory in which to capture and review events after the fact.

Once an event has been patterned in memory, we can refer to it repeatedly, as well as compare it with other events. Thus, memory provides a method by which we can analyze and predict a variety of activities in our surrounding environment.

And memory is not limited only to organisms with a central nervous system, but to any system that involves a cyclical process or processes that are repeated periodically, such as tides or planetary motions.

But what exactly is time?

One answer is that time is the actual rate or rates at which events are occurring in the universe. Events occur only in the present, and they are incremental, continuous and unidirectional.

All events occur simultaneously in the present. And it is strictly the function of memory that gives us the impression that events have a past or future.

There is a single incremental moment in which all events occur in the present. And this moment is equal to the shortest amount of time required to cause a change of state.

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As I look around me, I find myself observing the recital hall as a series of abstract relationships.

Everywhere I look, I see numbers, equations, shapes, curves, and angles. I imagine the entire configuration of the performer-audience space as a related set of integers, then algebraically, forming two-sided variable relationships, then geometrically as 3-dimensional forms, and finally as various arrangements of multidimensional hyperspace. I am barely able to imagine the exotic relations known only to those who engage in the highest languages of mathematics.

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I also find it interesting to see how people arrange themselves in a public space. Perhaps this offers a clue to how we organize our culture.

For example, in a public listening forum, those listeners who are biased toward experiencing an overview of the music will tend to sit near the back of the space. While listeners who are interested more in the magnified details of the music or its performance will tend to sit closest to the front.

The most experienced listeners shift back and forth in their minds as they listen to the music, alternating between general and specific cues within the context of the music and its presentation. In order to experience the music fully, these listeners will gravitate toward the center of the physical space, where they can gain a more comprehensive perspective of the music.

Taken to the extreme, the optimum listening position is the volumetric center of the listening space, found at the exact midpoint of the enclosed or partially enclosed space.

Also shifting around in the space during the course of listening, alternately moving away from and back to, the center position, in different directions at different times, can provide fresh insights into the music.

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As the various sounds and their reverberations fill the space, I imagine I am of the space itself, of the events that occur in space, and of the larger continuum of space.

What is the nature of Space? Where are we located in relation to the center of our Galaxy? In relation to our neighboring galaxies, the Magellanic Clouds? Or in relation to the Local Group of galaxies, including the Andromeda and Triangulum spirals? Or to the Virgo Cluster, which is the center of the supercluster of galaxies to which we belong? Where are we located in relation to the optical limit of the universe? Exactly where are we located within the large-scale structure of space?

Is Space a continuum filled with tiny indivisible particles, as Newton suggested? Or is Space a warpable field, bending and curving according to the relative motion and behavior of its resident bodies?

Is the universe expanding outward in all directions from some initial point in space and time? Or is the universe in a continual steady state in which matter and energy are endlessly formed and reformed?

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Our ability to visualize events in space depends on the light from the sun or other source that is transmitted or reflected from various objects in the surrounding media. A source of light, such as a star or candle, will transmit a beam of light at a frequency and luminosity based on the characteristics of the

source. If a beam of light strikes an obstacle along its path, it is absorbed or reflected by the obstacle, and will very likely be retransmitted at a different frequency, depending on the molecular characteristics of the object. The modified light beam eventually reaches the eye where it is transmitted to the brain, and transformed into the images that shape our perception.

It is the various *frequencies* of light, the different rates at which the photons oscillate as they strike our retina, which are perceived by the brain as different colors. The eye and brain, working together, resolve light frequencies into the various colors and hues that we are able to perceive. Like pitch and loudness in music, color is a perceptual phenomenon which occurs strictly within the central nervous systems of living organisms.

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As the music begins the process of ending, I am inclined to give-in to its sensual aspects, yet I am forced to notice the obvious transition, the self-consciousness in the music as it attempts to cope with its ultimate end.

What interests me is the transition in the music that cues the beginning of the end. And the performer's complete willingness to comply. It forces the listener to anticipate the final ending.

In music, transitions act as change agents that bridge the ending of one event to the beginning of another event. Transitions both separate and unite beginnings and endings of various events. While musical *endings* or cadences represent stability or finality.

As observers, we recognize both stability and change in ourselves and our surroundings in a variety of ways. And one of those ways is through the appreciation of grand schemes in general, and of music and its performance in particular.

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As the music ends, I am drawn to a flash of green somewhere in the foreground. Instantly I realize it is the green, fluorescent socks that my daughter insisted on wearing for her performance.

Once again I find myself noticing the formality of her dress. This time the accessories stand out. The matching hair barrette. The loud socks. My daughter's socks. They remind me of the music. Not because they are loud. Or because they are green. But because I associate them with the music, and the performance.
The music ends.

Applause.

I am once again smiling, a proud father.