The Technological Aftermath in the Verizon Hall, Philadelphia.

The Echoes of Acoustics: Success or Failure?

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Abstract

The paper talks about the origins and use of scientific acoustics in concert halls, it comments the social impact on the culture of sound, discusses the complexities of measuring and tasting something intangible, talks about the scientific nature of the discipline. I specifically analyze the recent history of the Philadelphia Orchestra new concert hall in the Kimmel Center for the Performing Arts. The objective of the work is to discern on technological success and failure, how is this evaluation constructed?
Introduction

In year 2001 Kimmel Center in Philadelphia was about to open its doors as a new monumental complex for music performance. Its central piece, the Verizon Hall, was maybe one of the most sophisticated concert halls in construction around the world. Millions of dollars were spent to achieve what scientific advancement lengthy promised during the 20th century: the perfect acoustics in a concert hall. However, the morning after the opening night, all seem to fall into tragedy, critics—among many others—chorused an acoustical failure—But how was this possible?

Was science the base of production during the 19th century? Or was it technology? In either case “certainty” appeared as an evident principle behind the “industrial advancements”. What was conceived by scientific means and therefore implemented by applied technologies or industrial processes, was now thought as right leaning towards social “progress”.

In the case of the emerging science of acoustics, this was not the exception. According to some influential literature in the subject, the incorporation of mathematics and physics as the basis for the raising discipline, a modern “soundscape” was born in America. This view is supported by the “successful” calculations of William Sabièm for the Boston Symphony Hall, as described in the colorful narration by Emily Thompson in her brilliant “Soundscapes of Modernity”\(^1\). However the effectiveness (or at least the “success” as evidence of these scientific actions) in Boston Hall can be questioned by the preexistence of other identical halls as the Wien Musikvereinsaal built at least three decades before, without the mathematical calculations of Boston Hall and sharing the same consensual success. So what is science adding to the notion of success and failure?

Exactly one century later sound science is represented in this case by one of the foremost acoustical engineers and hall designers alive, Russell Johnson. The author of the splendid Dallas Symphony Hall, a highly polemical work that recovered much of 19th century

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concepts of hall design and disregarding most models produced of the 20th century. (A hall in where the famous architect I.M. Pei ceded the interior of the hall design, both to the acoustician and to the influence of notable former director Eduardo Mata.)

His exceptional credentials and long experience almost guaranteed that the new home for one of the world’s leading musical ensembles the Philadelphia Orchestra would notably improve the acoustical characteristics of its former home.

However as we will see along these pages, there is a complex backdrop behind the construction of success and failure in technology. Multiple factors operate in this story; some influencing from a remote past, some driven by social forces of different scales and lastly others taking part as instruments of science and technology itself.

A main concern leading this brief study, is to question if after one century of “progress” do we get any closer to deciding weather this monumental effort in acoustics is really worth it, specially when we evaluate the success or failure of its materialization.

I.

Echoes of Technology: Histories of Success or Failure

Does Science evolve towards progress? Although this has been a common idea particularly during the last centuries, many examples seem to question this fixed idea. Specially, when we picture it, as an unquestionable truth.

In addition to this concern it would be dangerous to affirm that technology necessarily “evolves”; this hypothesis would imply, the existence of unbreakable patterns. However, from the socio-constructionist point of view, the notion of evolution would add the persuasive idea of “adaptation” to this discussion.

Indeed, technologies “adapt” to the input of socio-cultural practices and preferences; although in some cases, forced by the inertia of technological machinery, we also end up “adapting” to their use. This interplay between the forces of culture and technological determinism is imprinted up to a certain degree in every technological device, system or idea.
Furthermore, what concerns me more in this discussion is to clearly identify the sources of this interplay and particularly to pay attention to the voices that finally acclaim or disapprove its use.

Just to offer a brief theoretical framework of analysis, some of the arguments used here have strong basis in the social construct of technology offered by diverse scholars in the last quarter of the past century. More specifically in the SCOT model as proposed by Bijker and Pinch\textsuperscript{2}, in where on one hand a technological device (the bicycle) is shown as an example of “development due to socio cultural practices” and on the other the introduction of an “interpretive flexibility” in where the same technologies could have radically different meanings to different social groups. Lastly I am interested as well in the “counterpoint” perspective of end users as described by Kline, and in the “learned” practices that finally transform technology through time as initiatives of reinvention, diffusion or innovation as proposed by Rosenberg or Rogers during the 1970’s.

The evaluation of success and failure becomes the last \textit{platteau} in a technological ziggurat. Though is hardly clear who declares such result in practice. In economic terms, success might be measured by demand in product consumption, weather these are objects, artifacts or knowledge (as commercialized by universities for example). However this hardly sticks out as a full evaluation of its application and future consequences. For example, there are awesome technologies like the laser video-disc that finally, never end up fitting in a market niche; others are wide spread bad technologies that become very popular.

When science and technology take shape as part of large technological systems -as addressed by Hughes\textsuperscript{3}- there are elements of measurement particularly described as phases of growth, consolidation and momentum. Specially, in the latter where there is implicit a certain “systemic success” (it would contradict in a way to his self invocation of neutrality) in where institutional achievement in terms of production is supercedes all other voices.

In the case of acoustics, years of applied traditional knowledge were shaped in the “arts and crafts” of concert halls.


\textsuperscript{3} Hughes, Thomas “The Evolution of Large Technological Systems” 1987
Empirical testing of sound through spatial and material possibilities took place throughout immemorial times, until late in the 19th century where designers finally shaped rooms with “brilliant acoustics”. It is comparable to the surprising “technological achievement” of a gothic cathedral with scarcely any “modern science” in its construction.

As commented in the following parts of this paper, along with the 20th century applied calculations and physical understanding of sound waves consolidated acoustics as a branch of science. One of the key tasks of this brand new specialty of study was meant to be the perfectioning of music halls. Hence, as in other emerging sciences, a growing technical “certainty” –surely product of mathematical calculations- will completely redefine and rearrange the way halls were designed up to date. However the results included a number of catastrophic examples, ending in demolitions and re-adaptations.

“A hush fell over the hall in expectation of the soloist’s entrance. This as a big night in Budapest, the inaugural concert in a new hall in the Budapest Congress Centre, which opened in the late 1980’s. The young, immaculately dressed violinist entered, tuned his instrument, and then launched into Braham’s Violin Concerto. There was just one problem, we could not hear him –an that was in row F!”

As described by the British music critic Richard Fairman, an endless number of 20th century concert halls can be considered a fiasco. Among the abundant list of pathetic happenings, stands out the Barbican Center in London in where the audience was spreading long faces as they heard the congested sound and the early departure of the Queen of England.

Fairman attacks qualifying the middle 50 years of the century as where “hardly any new concert hall seemed to live up to its advanced fanfare” a “crescendo of high hopes, such in rapid disillusion”. “Never mind the extra inch of leg room or the bar serving Dom Perignon, if the acoustics are no good, the concert hall will not take off”.

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4 Fairman, Richard. “Sounds familiar many leading concert halls suffer from poor acoustics, and the newer ones are the worst” FT Weekend Magazine, Financial Times. 2004
5 Idem to 3.
II. 
On Concert Hall Acoustics

What is a concert hall? Although it seems quite obvious for some, maybe it is not so for many. A concert hall is an auditorium specifically designed to the enjoyment of live music and human voice, without any “artificial” aid as electronic systems of amplification. In consequence, a logic consideration is that beyond any other characteristic, music must be naturally audible and preferably, the hall will allow a fully pleasant sound diffusion, product of the performance. If there are complimentary electronic devices present in order to permit other kind of performances such as popular music, lectures or theater pieces, it must be turned off during all classical music recitals. This is a long and legendary social pact among the highly conservative rules of “classical music” rendition.

Among the characteristics of sound in a concert hall the concept of reverberation stands out as the most commonly “known”. Seating at the last role in an old cinema theatre thirty years ago guaranteed not hearing anything; sound waves were absorbed by fabrics, upholstery and carpets. On the other hand, listening to a Gregorian chant in a medieval church is a spectacle of echo and harmonious resonance due to large spaces and hard surfaces. There is reverberation in both examples but in none is ‘correct’. Reverberation time is the fullness or singing tone to the performed music in any hall, or the controlled “echo”. However the acoustic quality of a room cannot be evaluated alone by this concept. “Two rooms with equal reverberation time can sound completely different!”  

Other important characteristics include “clarity” which is the degree to which individual sound stand apart from one other, “definition” considered to be the degree to which sounds that follow one other stand apart, “intimacy” defined as the proximity feeling of the performance. Others as important as well are “texture” is the overall impression of patterns

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6 “Room Acoustics / Concert Hall Acoustics – an Overview” Helsinki University of Technology Press 2000.
arriving to our ears, “spaciousness” which is the lateral reflections picked by both ears, “diffusion” the high frequencies of music get lost in the architectural intricacies of the hall and lastly “strength” which is the perceivable loudness of musical notes. These characteristics will help us to “have a taste” of the enormous complexity of “tuning up” a hall.7

According to some musical dilettantes achieving good acoustics is an extremely complex balancing act. The sound of music inside and enclosed space is affected by a long list of variables everything from the shape of the room to the thickness of the walls to the number of seats determines the acoustic environment. Acousticians attempt to collect and measure the quality of sound in a specific space and it all gets very technical8. So in order to reduce this complexity and offer a ‘digestible’ idea of how this “balancing act” is achieved is better to imagine an old radio v-shaped antenna. You turned the antenna a bit and one station sound good, but others may not so. Therefore it becomes an endless problem, in where no “ideal” position exists for all stations. Every move you make you ruin every other station reception, so when a lucky one set a good position it became untouchable! Although it sounds too simplistic, this resembles a “ hall tuning” labor in where every component and characteristic is interlocked between sound physics and the subjective impression of the acousticians. A hard endeavor indeed!

In order to talk about some interesting aspects of the historical development of the concert halls seems appropriate to first leave present who are the actors and which are the networks of interest. On one extreme we have end users, the audience. What audiences want? Hear the best possible performance for their money. Music is not a human need, though as other expressions of art becomes a trigger of emotions. In between we have the educated, an elite of Connoisseurs and Mélomanes, dilettantes, critics, industry observers and scholars. Their task is to establish quality standards in musical perception, trends and taste preferences. (Both in acoustic and musical production) On the other we have the musicians and the directors (A breed apart) which interests are the sublimation of music through

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7 “Room Acoustics / Concert Hall Acoustics – an Overview” Helsinki University of Technology Press 2000.
8 Damian Foweler. “Complex balancing act shaped sound space of Philadelphia Orchestra’s new verizon hall” Andante Magazine. 2003
interpretation. We also have actors of transcendent influence as patrons and politicians. Patrons take shape as individuals and corporations. Both parties are interested in sponsoring the philanthropic causes, the first could do it with no further interests, remaining anonymous or, on the other hand wishing to become immortalized by their actions. Corporations support these causes from a variety of perspectives, ranging from some disinterestedness to evident advertisement campaigns or as often happens, as tax exemption strategies. Politicians play a role as public promoters of culture and the arts, their interests span from public wellness to the growth of personal prestige in order to climb political ladders. Lastly, designers, architects, engineers and acousticians whose are in charge of the conceptualization and materialization of a project. Their set of interests notably vary in between, architects are concerned by their artistic egos most of the time and their own gremial approval, they are interested in sculpting space and form. Acousticians are responsible of the technicalities of the projects; they directly apply scientific knowledge to the equation. Their goal is to achieve the best possible sound in the hall. Finally engineers who will push for efficiency and practicality, their interests usually gravitate in feasibility and material achievement. Their task is usually undermined, but the physical construction of this macro objects –halls- rely on their craft direction and skill. We should add as a necessary appendage managers and administrators –theoretically they should not be part of the chain- whose in practice influence with their criterions the final result of things. This is the actor-network map.

Now let us briefly take a detour to through some of the typical concert hall configurations of the last centuries. The first music halls designed purposely for performance, were conventional rooms in palaces and buildings with improved acoustics. Later, became rooms with certain isoptic properties and equipped with basic stages and prosceniums; these new rooms gradually left palaces in order to become autonomous buildings. Younger branches of Renaissance patrons like the Visconti or the Medici would become large promoters of the 18th century opera explosion. Early large scale opera houses such as La Fenice or La Scala will set the paradigmatic configuration of an achieved hall, either in horseshoe or in a extended semicircular plan shaping a very high central room surrounded by balconies at every level. Maybe a boring technicality here, but I cannot stop marveling of the designers
intuition in creating such a low reverberant spaces more than two centuries ago, thus allowing us to appreciate human singing at its peak!

One century later, western enthusiasm for symphonic and chamber music helped to build music halls all over the five continents. According to specialists and well-documented chronicles some of these Neo-classical marvels reached an unanimous level of acceptance. Just to mention two of these wonders are the Musikvereinsaal in Vienna or the Stephaniensaal in Graz, both designed by the last level of acoustical intuition and -learning by practice- applying the so called “shoe box”. Schematically, its success relies in the warmth of lateral reflections, producing a wrapping effect in the audition.9

What comes next is a tortuous path. As I will discuss later when talking about the scientific study of acoustics and its impact in concert hall designs, I propose first to make a brief description of the configurations conceived during the 20th century. Political changes during the central 50 years of the century pressured designers to create halls that popularized the diffusion of classical music. Is interesting to know here that concert hall music had an elitist connotation –clearly related to the extinguishing monarchies-, however it survived while it transformed into a form of national evocation and pride. A good example would be the vicissitudes of Aram Kachaturian as a socialist composer. Halls were demanded a much larger scale in order to accommodate the masses, but the bigger the size the bigger the problems.10

The hall transformed into several shapes, particularly some particularly bad for acoustics: the fan and the amphitheatre, and its characteristic stepping sidewalls and soffit. This basic form had its origins in Mesopotamia and Greece and was functional as a public agora.

But back to the socialist ideals, a socialist German architect Hans Scharoun crafted by “a combination of skill and accident, revealed a new way forward for acoustics -the vineyard terracing and the radical concept of music in the round”11 in a new concert hall for the quintessential Berliner Philharmonie. Or heard by the words of Sharoun himself “Here you

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9 “The Shape we’re in” Acoustics, Audio and Video Study. University of Salford, UK 1998
10 Fairman, Richard. “Sounds familiar many leading concert halls suffer from poor acoustics, and the newer ones are the worst” FT Weekend Magazine, Financial Times. 2004
11 Idem to 7
will find no segregation of ‘consumers’ and ‘producers’, but rather a community of listeners grouped around an orchestra in the most natural of setting arrangements”.

The implications of both concepts were of large-scale proportions. Regardless of place or idiosyncrasy these two concepts were indiscriminately transferred to the developing world. Although an ample number of specialists favor the “vineyard” as a layout capable of produce side reflections, others think there you pay the price of the undoubtedly spatial spectacle with a strong lost of roundness, intimacy and musical definition.

Not until the last quarter of the century, the famous acoustician Russell Johnson shocked many “concert hall designers” with his new formula -back to the box, with a hint of an opera house. For “modernist” architects this was an ideological “sin” a regression to the past, a betrayal to the modern forces of progress. But few care, as quoted earlier in the introduction as the Dallas Symphony Hall was laid-out by the acoustician and not by the architect. The result is a highly pleasant sound experience and a consensual applause in Johnson’s career.12

As we could briefly sketch in this section, some of these hall configurations were praised and received with great optimisms in its own time, though later became sound failures. As in other cases as Birmingham or Dallas shown exactly the opposite.

III.

Is Classical Music Classist?

Julian Johnson proposes in his book Who needs classical music? Cultural Choices and Musical Values13, that the “experience” of classical music is not elitist, what does become classist are the social ceremonies around its performance.

In the center of Johnson’s argument is the notion that “classical music offers not merely the basic pleasures of melody, harmony and rhythm, but the meanings which these elements can reveal when explored in the process of composition by a master. It is just this intense

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12 Damian Foweler. “Complex balancing act shaped sound space of Philadelphia Orchestra’s new verizon hall” Andante Magazine. 2003
emotional and intellectual engagement, shared by composer and listener, that pop music and pop culture reject”

Classical music is as any other genre of music, not elitist indeed. However its understanding, appreciation and accessibility could imply certain socio-cultural barriers. In comparison live performance of classical music, popular music is much more expensive in general so it is seems not to be specifically a problem of cost. (There are hardly any better “popular” alternatives as subsidized or discounted tickets in than in the classical genre)

Furthermore classical recitals gather elites from different spheres into one mixed environment, on one side the echoes of an European bourgeoisie of educated families still rooted in 19th century customs, on the other a troupe of intellectuals, scholars, enthusiasts and other interesting people of cultural aspirations.

In addition, an audience that does not belong to any elite: such as tourists, cultural or social arrivistes, weekend strollers and daydreamers looking for healthy entertainment.

You do not need to be Luchino Visconti or James Ivory to observe the rites of these elites in action. The ritual among the bourgeoisie comprehends a dressing code, long coats and tuxedos (at least dark suits of imported poplin) as well as long dresses and public exhibit of fine jewelry ornaments; include a polite salutation as well, sometimes even between people that hate to each other and lastly a good costume ballet of polished manners and discrete laughs. Maybe all accompanied by a glass of expensive wine.

The ritual among the intellectuals is also predictable; most of them are disguised to remain anonymous, although precisely in that pretentious ‘scruffiness’, they all stand out as a group. Lets begin with the “casual intellectual”, individuals with an untidy look (or dirty look) always nihilistic and depressed. Several times these fellows are unemployed musician, real artists, philosophers and unknown writers; the “strong intellectuals”, a fauna of Berlinesee style people, invariably dressed in black regardless of weather conditions, usually wearing sophisticated eye ware and always looking for a hanging mirror. This group usually comprehends fashion designers, architects, best selling authors and gallery owners.

There are also the “scholars” in two fashions, the upscale tenured professors wearing bow ties (the only ones partially accepted to salute members of the first group) and finally low-scaled teachers and musical critics, all dressed in lightly wore fleece suits or notably out of
fashion attire of varied sources. (We will not mention the personnel. Some of them look as extracted from a neorealist film: such as the bellboy (without bell), the elevator operator or the hall guide with a pocket lamp) Members of this social circus will eat alive any flaw in their equals, make ironic comments of the members of the opposite elite and discretely laugh of all other public (victims). Nonetheless there is an irresistible charm in this ceremony.

Besides the tones of humor in the description of the social divide that permeates concert halls, statistical numbers are not very promising. (Even tough classical music still being one of the pillars of culture) A national consumer study under the Classical Music Consumer Segmentation Study (CMCSS) by the Knight Foundation -including the same Philadelphia Orchestra audience- shown a few years ago, that roughly between 10 and 15 percent of adults of all ages have been exposed in a moderately relationship to classical music, although most shown weaker ties. Across the 15 study cities one out of four adults are prospects to assist to a concert hall. However, only half of those showing very high interest of preference for attending to live recitals ever actually attend.14 But these statistics do not show the enormous popularization of classical music during the last hundred years.

Diffusion of classical music took a quantum leap with recorded music and the radio. Although I am talking here of consumers, here I agree with Kline in considering a two directional flow of “preferences and tastes” and distrust the sociologists concept of “penetration” or “influence from the big city”. I try as well to point out the evident exponential increase in the inexpensive offer of all sorts of music through new technologies. Not surprisingly one of the most interesting phenomenon, was the partial democratization or at least the wide spread availability of classical music. No more intimidating scenes as when Citizen Kane demands the young girl to play the piano and sing for him, as if listening to a record. Perhaps in this sense, among the first beneficiaries of this technological diffusion were family members such as housewives and children, particularly female, as well as minorities and other oppressed classes. Music was now on

14 “Classical Music Consumer Segmentation Study” JamesL. Knight Foundation. CMESS, 2000
the route of popularization, but in the case of classical music making generalizations could be especially dangerous.

As we learn from the emblematic American composer and writer Aaron Copland\(^{15}\), that listening to classical music could be rather different to what we think. Copland strongly reacts against using classical music as background for doing other activities; he clearly states that we cannot read or do anything else but focus in the sole appreciation of the music. True in essence, but strongly dogmatic in practice; Copland continues describing a long number of skills, knowledge of instruments and musical forms, halls and basic principles of sound and acoustics, history and so on, as indispensable for the full understanding of music. Beyond social elitism, there seem to be an intellectual division as well.

Technological diffusion played an interesting role in recent musical history. Along the 20\(^{th}\) century, classical music was recorded and broadcasted for the first time either as sound or sound plus images. It is undeniable that thanks to this new media, this kind of music reached a larger auditorium. However, in the 21\(^{th}\) century some of these barriers could be taking a different shape thanks to emerging technologies, and therefore posing new social conflicts. According to Carolyn Kliener of Science & IdeasMusic\(^{16}\), there is a downhill when she chronicles the decline of the record industry, where artists and executives are looking to the Internet to build audiences. For example she accounts 73 American orchestras in year 2000 approving the distribution of their music on line, in that same year the Philadelphia Orchestra will launch their first live performance net-cast for only $2 dollars per-listen. In just that evening, 15,000 people tried to log on.

For the purpose of this paper I should only bring to the discussion the fact that although classical music is more accessible than ever in our days and tendency is exactly on that same direction, we should not set aside the particularly elitist ceremony, surrounding its performance.

\(^{15}\) Copland, Aaron. “What to Listen in Classical Music”

IV.

Acoustic Alchemists and the Enology of Music.

“While much information can be graphed on computers, it still takes human intuition to make a single assessment. This is not science.”\(^\text{17}\) while “the transcendent artistry of sound that is unamplified, unfiltered, unequlized and unedited seems still to inspire these enormous acts of faith.”\(^\text{18}\) In where “Acusticians are viewed as Merlins is their products turned out successful to any degree, otherwise as quacks. Their profession –science, art or something in between- was something like alchemy”\(^\text{19}\). During the centuries predeceasing the scientific acoustic “revolution”, halls were designed by trial and error, incorporating small variances to the layout, however several of these modifications were more influenced by social and cultural changes. Before we go any deeper into sound in halls is appropriate to comment on “taste”.

Acousticians imprint their personal “taste” in sound control design. This could not be otherwise, even if they would intent so. These are the personal expressions of science -or as Princeton’s iconic Historian of Engineering David Billington describes as “forms of structural art”- as when referring to design of bridges. The acoustician creates –through science- forms of sound art. However a last factor plays a key role in this story, why acousticians are seen as alchemists and engineers do not?

An analogy between Acoustics the science-art of Enology may help us to elucidate this problem. Even acknowledging that “taste” is present in engineering, technological expressions must be supported by scientific certainty. A bridge cannot be a bridge if it does not “span”, therefore the degree of subjectivity in its contemplation does conflict with its “scientific essence”. As described by David Nye\(^\text{20}\), society seems to gain certainty in celebrating these fruits of material progress as “the triumph of reason in concrete from”.

\(^{17}\) Damian Foweler. “Complex balancing act shaped sound space of Philadelphia Orchestra’s new verizon hall” Andante Magazine. 2003

\(^{18}\) “Sound good to you? The Art of Acoustics” The Wall Street Journal. 2003

\(^{19}\) Robert Commanday. “A master acoustician sound off” The San Francisco Chronicle. 1989

\(^{20}\) Nye, David “American Technological Sublime” MIT Press 1994
But in acoustics, as in enology, the subjective characteristics of its contemplation and enjoyment are indeed interlinked with its scientific validity.

Wine tasting is one of the crucial expressions of human sophistication. It involves complex previous knowledge and experience -resembling much Copland’s commandments for music appreciation- on geography and weather, on harvesting, on wine making, on tradition and history, on aging and wood, on chemical process and chemical technologies, on instruments, on smells and flavors.

A sommelier is the person in charge of professionally “tasting” wines, its deep knowledge of the above “guarantees” the success of his preference. Facts or magic -but just try to refute a sommelier when you dislike a bottle of fancy wine- if he founds virtues and notes of cacao, wild cherries, hints of Roquefort cheese, and traces of cayenne pepper, and you do not you will end up discredited in front of your friends. Unless you are one of its kind: a specialized critic. But is there any room for us?

The acoustician has a “tasting” task, but without having the hall yet built! So for many, we should rely in his musical culture. In interview Wolfgang Sawallisch, former musical director of the Philadelphia Orchestra says about Rusell Johnson, the acoustician: “He is a good listener, which perhaps is what an acoustician must be”. But even more specifically he has publicly talked of a “list of likes and dislikes in his own sound aesthetic”. When the music and acoustician Chirstopher Brooks talks about his experience he finds a certain tension between listening as an acoustician as listening as a lover of music…when I am the latter I listen to the story being told by the performer in the precise emotional language of music. When I want to follow every detail, every note and even silences I am an acoustician.

Father along the elitist specialty of music, where are the ‘larger publics”? In musical contemplation -if this could apply to sound- intellectual elites understand or will try to understand the subtleties of music and -as in wine tasting- this occurs only when you can distinguish between similar pieces thanks to long hours of study, comparison and

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21 Wolfgang Sawallisch.,”The Philadelphia Orchestra’s new home” Stage Bill Magazine. 2001
22 Willa J. Conrad. “Arts cner’s opening is music to his ears” The Star-Ledger.2001
interpretation. Therefore it is debatable if the “bulk of concertgoers”\textsuperscript{24} would perceive such delicate qualities.

In the other extreme, we can enjoy wine in a mundane form; we can actually \textit{accompany} our food or any other activity just for the pleasure of doing it. The same happens with sound, as described in “Consumers in the country”\textsuperscript{25}, housework was more less “monotonous” with the \textit{company} of music. We will not be “condemned” for such sacrileges. In my opinion the “enology” of music presents a complex relationship between consumers –both the “larger public” and the “specialized public”- mediators such as critics, musicians and other opinion makers, and finally acousticians. In fact acoustics is a strange activity crossing over between the thin edges of “boundary science” -as discussed by Pinch- and “hardcore science” based in strict mathematical outcomes.

V.

\[ T = 0.164 V \], \textit{Acoustical Scientists at Work}\textsuperscript{15.5}

The recent publication of Emily Thompson’s Soundscape of Modernity\textsuperscript{26} is a good opportunity –specially for us looking for the unattainable understanding of the musical \textit{raison d’etre}- to challenge our ears. What sounds best? Halls with scientific acoustic or with “traditional” acoustics? Thompson has crafted wonderful book, but not exempt of polemic.\textsuperscript{27} She opens fire affirming that “an examination of the critical reception of the acoustics of Symphony Hall demonstrates the complicated combination of social, cultural and physical factors that go into the process of defining, as well as creating “good sound”, the answer is not more than Bravo!. I only find slightly uncomfortable the idea of declaring Boston Symphony Hall a break trough as an acoustic “success”, I will further explain why in the conclusions section of the paper.

\textsuperscript{24} Nick Wingfield. “While recorded music has advanced in leaps and bounds, the technology behind live performance has evolved much more subtly” The Wall Street Journal. 2002
\textsuperscript{25} Ronald R. Kline. “Consumers in the Country” edited by Pete Daniel and Mary C. Neth, 2000
\textsuperscript{27} It is hard, not to come back to Boston Symphony hall after reading the book and reading several times Brook\textsuperscript{27}’s divide between “\textit{listening as a music lover and listening as an acoustician}” But I better keep my personal remarks to have something to say in a small postscript on methodology.
The book describes how technology and the way audiences ‘listen’, forged the aural culture of America during the first decades of the last century. In its first section it offers a detailed account of the early mathematization of acoustical design.

Its pioneer, Wallace Sabine is a historical landmark of concert hall acoustics. His mathematical formula to calculate reverberation is indeed the founding of acoustics science as a “formal” discipline. However, this fact does not limit the long empirical study of acoustics throughout centuries and does not opaque the shiny achievement of traditional concert hall making.

Perhaps the one of the highest regarded music halls in the world, the Grosser Musikvereinssaal was built thirty years before acoustics was born as a science. The similarities between the Boston Symphony building and the Austrian hall are astonishingly clear. Practically identical in proportions and boxed configuration, long side balconies at each flank and grand décor. One main difference, one was achieved empirically the other scientifically.

Acoustical science is certainly the final epilogue of a century of scientific, technological and industrial achievements. As a statement it becomes powerfully convincing as the triumph of reason before intuition and practice. If mathematics and physics really explain the success of Boston Symphony Hall, we are eye witnessing -through the glasses of history- how science is socially constructed as a public myth.

If Thompson is right in her assumption, it would become a scandalous demonstration of the aforementioned. At this point, I urge the reader to remain patient.

Other similar cases help to add to the controversy. In 1920th, the first large-scale European experiment was carried out in the new scientific application of acoustics in hall design. The result was the Salle Pleyel in Paris, its sound quality described as a “notorious disappointment” from the day it opened.28

In defense of Thompson’s argument, a peliad of engineers and other scholars seem to be confident in numbers; “at any rate, new technologies will create optimum acoustical

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28 Fairman, Richard. “Sounds familiar many leading concert halls suffer from poor acoustics, and the newer ones are the worst” FT Weekend Magazine, Financial Times. 2004
This daring statement is probably supported by a century of scientific and technological advancements ... “With growing information acoustics has lost much of its mystique and become a set of generally known rules and numbers that can be calculated.”

In this sense, is hard not to be persuaded by technological advancement. Acoustical engineers continue... “The prediction of concert hall acoustics in advance has changed from an art into a controlled and precise design process. The reasons are the same as Meteorology; the evolution of mathematical models and the ever-continuing growth of the power of computers.”

There seem to be an enormous faith in technology, and there are reasons to support this trust. In recent years several Nordic universities have bet in advanced research of acoustical computer modeling tools. One of the state of the art programs developed to date is Opus. This powerful tool uses a three dimensional model to recreate sound behavior with ray-traces. “Sound rays” are launched and measured in every seat of the virtual hall; a number of parameters can be read from the data, including a comprehensible interpretation of sound quality in definition, clarity and diffusion.

Few years ago the University of Denmark conducted a study using Odeon. This project intended to test all possible hall configurations, and the study reached the impressive number of 31. The results however were quite unexpected, the main findings shown that higher halls give more intimacy when they keep a narrow proportion, the best sound “spots” are in the center of the main floor or under a balcony, carpeting is a good material – contradicting most other 20th century studies- and other ideas well experienced in the past.

Nevertheless top designers in the world as Artec Consultants of New York or Kirkegaard Associates of Chicago, are turning away from the scientific debate, towards the design and implementation of “flexible” acoustics. In the case of Verizon Hall, Artec incorporate what they call “instant adjustability”, which consists in an “extensive system of remote

31 Idem to last.
controlled curtains and banners of velour or canvas that absorb sound and reduce reverberation. As these fabric devices are move into the hall, the reverberation is reduced. This “reverse effect” is a fascinating example of how science is now subordinate to emerging technologies- Finally as it is move into storage reverberation gets longer.”

What we have learned by use is hardly regarded in our times. Faith in progress is better exemplified by the epitome of the American soundscape modernity -according to Thompson- the Radio City Music Hall. For the first time electronic amplification was installed in a music auditorium. Its engineers were prophetic, “the sound will be so perfect that you won’t be able to tell that the sound is being amplified” and according to the book the hall was an “acoustical success.”

The analog console installed in Verizon Hall is so advanced that has been described as “just feel real rather than processed, it is a huge quantum leap in digital desks”. But it has been promised to be used just in case of other kind of performances and lectures (sic). The last step has been taken in some halls as in Chicago’s Jay Pritzker Pavillion, in where “new speaker technology will accommodate digital sound intended to simulate concert-hall acoustics”.

A last question concerning applied technology to acoustics would be, for how long will be listening to classical music in its “pure naked sense”? And in regards to acoustical technology could we ever interpret sound prediction in terms what Thompson calls as “good sound”?

VI.
The Aural Glamour

The longing for Beaux-Arts buildings remains present even in our days. The pleasant sense of elegance in these neoclassical buildings, have been present in the materialization of

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grandiose dreams of all nations and cultures. Philadelphia, was not the exception of course. Its old concert hall, better known as the Academy of Music is an elegant Beaux-Arts building from mid 19th century, following the European classical molds of Italian opera houses. Designed by the rules of luxury, the vestibule and the interior of the hall are high spaces with ivory walls, patterned moldings and French windows; contrast is given by golden brass ornaments and railings, burgundy drapes and carpets and some black details.

“Many people are sentimental about the Academy of Music, I adore the Academy too but an opera house is very different acoustically from a concert hall” Maestro Savallisch comments for Stage Bill36. “Symphonic music, just like opera, is for both the eyes and the ears. But for the ears more importantly” he concludes.

Indeed music is for the ears but spatiality of the hall is important as well. Visual impact is a critical element for musical perception. According to experts there is “psychoacoustics”, a subjective perception of audio-visual experiences, able to significantly persuade us of good music (even with poor acoustic).

But public nostalgia for the old orchestra hall goes beyond the building grandeur. Both generations of concert-goers of one and a half century constructed an aural myth: the “Philadelphia sound”.37 This curious mote became world popular among connoisseurs as a very unique tone to interpret music. The legend tell us, that the dryness of the hall was a shortcoming that the musicians learned to overcome, therefore inciting legendary directors as Stokowski or Ormandy to establish “the rich and silky tone”38 as a fixed characteristics of the orchestra style. “The orchestra’s musicians continue to pass along this sound tradition as new members join the ensemble every year”39

“Of course the ultimate concern with a symphony is how things sound. With the Philadelphia Orchestra this has spun out into paradox. What happens to the sound then when it settles down into an acoustically perfect hall? Having lost its distinctive hall, will the ensemble someday lose its distinctive sound?” These worried every one involved, not

37 “The Philadelphia Orchestra and Kimmel Center Official Communicate” 2001
38 Valerie Sher. “Changing its tune/ Orchestra, new conductor will take Philadelphia sound to new venue” Classical music critic Magazine. 2001
39 idem to 33.
least of all the musicians. “We were frightened to death with what might happen to the Philadelphia Sound” said one member of the orchestra.40

In other declarations Maestro Savallisch is fully confident that the new hall will be a very exciting place to his the orchestra in what he calls new ways.

During the design phase, a historically critical moment occurs when the architects negotiate the form of a hall in plan. On one hand they have their own professional interests as the spatial quality and formal impact of the carved shape –and often big egos too--; on the other, the acousticians and the musicians who fight for the intangibility of sound efficiency.

In the case I refer in the introduction, Rusell Johnson took control of the hall shape above the architect. He obviously chose the box, and thus created a monumental controversy in architecture. I recall visiting the hall after its opening night, and the acoustics was simply marvelous -particularly if one is fortunate to hear its monumental organ. A superb technical achievement or a success perhaps?

“The hall is an instrument which you have to know” said cellist Yo-Yo Ma41. In the case of Verizon Hall, Johnson was not in full control. The justification of the final form, a cello-shaped form was an initiative of Rafael Vignoly, the architect. He persuaded Johnson to accept it, but curves are uneven distributors of sound.42 Jerry Mandel, President of the OC Performing Arts Center in California considers “the cello-shape a total mistake”.

Vignoly who has been recently sued by the client, claims innocent because he was hired to create a “fabulous building” according to his lawyer. Kimmel Center set the basis for the legal action in “defective and deficient design work”.

To complicate more things, the official communicate of the Kimmel Center -both published and distributed on-line- justifies the cello-shape as an acoustical strategy “the orchestra was placed onstage behind the proscenium, this acted like an alcove choking off some of the

40 Andrew Druckenbrod. “Arts complex opens in Philly with fanfare” Post-Gazette Classical Music Critic. 2001
42 Timothy Mangan. “Sound repercussion for O.C.? Acoustics-Philadelphia’s verizon hall opens to troubling reviews;its acoustician will design arts center’s concert hall” The Orange Country Register. 2001
43 Peter Dobrin and John Shiffman. “Kimmel suit cites architect” The Philadelphia Inquirer KRTBN. 2005
sound, this solution added reverberance to the hall” this is fully debatable and defies reflection patterns found through centuries.

In any case, “no major American orchestra has pined for a new hall as long and as ardently as the Philadelphia Orchestra, and no acoustical designer has been as sympathetic to the cause as Russell Johnson”44. A 15 year project for the new Philadelphia Orchestra hall is finally taking shape. The 2,500-seat music hall is the cultural centerpiece of Kimmel Center for the Performing Arts, built at an unprecedented cost of $265,000 million, makes it historical debut this week!
After long years of work and struggle, the hall will “proof” its efficiency and “taste” and all persons involved in its creation are finally at stake here. Tomorrow the hall will open its doors for the first time to a whole world of musical fauna.
Is the moment of truth for the strange equation that Sabine did not understand; scientific progress in sound prediction and modeling, centuries of inherited acoustical technology, generations of listeners and scholars of music, which as result all remained involved. Besides answering now who is responsible, the tension grows. Should we add one more failure to the long list in the 20th century? Or should we finally declare the triumph of reason above alchemy?

VII.
The Interpretive Flexibility of Acoustics

The expressions of controversy are generally governed by interpretive flexibility45; there are a variety of interpretations on equivalent observations -or in this case auditions- these diversity usually has an embedded number of interests, of both actors and networks involved in the polemic. It then moves gradually towards one agreed upon interpretation, and the controversy gets “stabilized” as an outcome. We expect in this case to look for that “closure” of temporary agreement as in the shape of technological success or failure as we

44 Willa J. Conrad. “Arts center’s opening is music to his ears” The Star-Ledger.2001
will see in the conclusion. I will present a recollection of opinions from diverse actors in a strict alphabetical order, but all the italics are mine:

**Acoustical Scientists**

“We will probably start using them in mid-February in a very modest way, maybe just in a rehearsal. I think it is quite evident that the reverberation is not at this point what it should be…” Russell Johnson, Artec. Interview with Michael Markowitz, The Philadelphia Inquirer. Feb. 2002

**Connoisseurs and Mélomanes**

“The sound of the orchestra, led by music director Sawallisch was dominated by treble registers and lacked warmth, though solos were clearly heard…but the sound was distant and small and lacked presence. The audience should be swimming the lushness of Ravel, but were parched” Andrew Druckenbrod, Post-Gazette Classical Music Analist.

**Concert-goers**

“Even better, try it out "in person." That's what my wife and I did, along with thousands of others, who visited the Kimmel Center for an "open house" on Sunday. Verizon Hall (the large concert hall) is a visual treat. As for the acoustics, I guess it's not fair to pass judgment without the custom adjustments for different types of performances. We tried out two different locations while a solo pianist was performing. Front and center in the orchestra, the sound was less than ideal--muffled and indistinct. However, on the second tier, the piano sound was crystal clear” Henry Maurer, Cherry Hill, NJ. Mon, Dec 17 2001 8:07 am Google Group

“How about "the big cello”? the seats were well filled, but with all the coming and going, I wouldn't pass final judgment on the sound. Not to mention my daughter's impromptu percussion accompaniment....We're going to sample several different
locations before picking one when we resume our subscription next year” Mathew Mitchell posted Tues, Dec 18 2001 7:50 am Google Groups

“Laura and I attended the Philadelphia Orchestra concert on Tuesday, part of the first series of subscription concerts in the new hall. You're immediately struck by how much more present the sound is. I think it's probably because the traditional proscenium stage has been replaced by an open hall. More sound is getting out to the audience, which also explains the complaints that the musicians have that they don't hear each other as well. My impression of the hall (from one with a completely unprofessional ear) is that it is quite neutral at the moment (not favoring one section or type of sound, nor having a strong character of reverb or anything else), and also quite precise (everything sounds very evenly balanced). The increased liveliness of the hall is apparent even to us amateurs. Mathew & Laura Mitchell posted Sat, Jan 12 2002 1:59 am

Critics

“At the Kimmel, now you hear it, now you don’t!” Peter Dobrin, The Philadelphia Inquirer Jan. 2002

“This hall is an acoustical Sahara. Unfortunately there seem to be some serious acoustical problems. The sound is dim, diffusse and unsupported, somehow managing to be both muddy and bone-dry. From my vantage point on the first tier beneath the overhanging balcony the singers could be singing is another room, a sensation of eerie remoteness that concertgoers who go to Constitution Hall may recognize…It must be very dispiriting for the Philadelphia Orchestra” Tim Page, Washington Post, 2001

“The “Philadelphia Sound” first arose as an effort by musicians to sound “normal” in a notoriously non-resonant setting.” Thomas Hine, Philadelphia Magazine 2001
“Verizon Hall was seriously short of sonic warmth...sound was clear and true through the whole frequency range, but it lacked liquescence and spaciousness.”
Scott Cantarell, The Dallas Morning News. 2001

“There were problems, the cellos paradoxically for a hall that mimics the shape of a cello sometimes dropped out listening range” Peter Dobrin, Philadelphia Inquirer. 2001

“The hint was not encouraging. Andre Watts piano was thin and distant, the voices of the singers lacked bloom and presence...but in fairness it is too early to say...Beethoven sounded less present and lacking in warmth, Kernis sound a bit clinical”... “A trusted colleague from Paris who had been unhappy with the sound in the hall from his seat in the orchestra section, where I also sat, moved to the top balcony for Ravel and reported the acoustics were quite impressive” Anthony Tomassini, The New York Times, Chief Music Critic 2001

“When, at long last, Valhalla arrived in 2001, with an acoustically correct concert hall in the new Kimmel Center for the Performing Arts, the auditorium inevitably drew more attention to itself than to its prime resident. Though it could never match the Academy, it was indeed beautiful. But just how much better were the acoustics? (Considerably, it turns out.) James Oestreich, Critic, New York Times, 2005

Industry Observers

“The thing that made me so angry with the opening night is that we were told very clearly by Rusell Johnson that the hall was in process, but some critics still passed a lot of judgements saing this is what the sound is and that’s it; I still believe this will become one of our country’s finest concert halls” Sedwick Clark, New York based writer/producer for Andante Magazine 2001.

“Verizon Hall reached a sonic danger zone, where sound tends to become and lacking in warmth...I think it is too large.” Jerry Mandel, President of the OCPAC in California.
Musicians

“Still not all the musicians were happy after the inaugural concert. One of the Orchestra players who didn’t want to be identified declared –I don’t think it will have the same quality of the great halls of the world, they’ve made the basic error of trying to make the hall serve as a venue for different types of performance, it should have been specifically designed for the symphony orchestra” In “Complex Balancing Act Shaped Sound Space of Philadelphia Orchestra’s New Verizon Hall” by Damian Fowler, Andante Magazine 2001.

“But actually hearing it tonight, there is such an incredible clarity to the sound” Cellist Yo-Yo Ma, interviewed after the concert by PBS.

“Sawallisch is reported to have said that it is a 'dangerous' hall, meaning that you could simply hear everything. Ax was enthusiastic as well” Peter T. Daniels, Concert-goer. Google Groups on Classical Music December 2001

Patrons

“ There is a low level of reverberance and a relatively low level of orchestral sound according to Artec…cost…boy, that’s like another conversation, we don’t have a cost estimate yet [to correct the acoustical problems] we have to identify funds to commission people who would arrive at the estimates” Janice C. Price, President Kimmel Center in interview for the Philadelphia Inquirer.

“The sound is much better balanced, much more rounded. Always from the very beginning, it had a great deal of clarity, and where we were striving for last season was to get warmth and bloom to match the clarity” Simon Woods, Philadelphia Orchestra Vice President for artistic planning and operations, in Andante Magazine 2001.

“ With any new hall there is usually some disagreement of opinion, but also an overall sense as to each hall’s ultimate potential. It will adapt to the great musical
works that Philadelphia audiences have learned to enjoy” Official communicate by the Kimmel Center for the Performing Arts. 2001

“Certain things sound a lot better…the musicians have been particularly sensitive with the settings of the doors to the acoustical chambers as well as the position of the canopies above the stage. If you can get the sound basically right –as good as possible- it will sound great for most kind of music” Simon Woods, Philadelphia Orchestra Vice President for artistic planning and operations, in Andante Magazine 2001.

Scholars

“The third method, recently prevalent, is failure prone. Philadelphia’s Verizon Hall, Russell Johnson’s 2002 creation, fell so far short of an acceptable sound as a result of a shortfall in funds and ‘construction deficiencies’ that the acoustician was summoned back this year to advise how it might be repaired (answer: expensively and without guarantee). The million-here, million-there school of fundraising has lost its appeal to middleweight donors, who feel unappreciated. It also tends to leave last-minute budget holes” Norman Lebrecht. Lebrecht Weekly, La Scena Musicale 2005

“The bottom line is that on a very basic level the hall is acoustically sound, at the very worse Verizon Hall doesn’t get in anybody’s way, and that is serious good news for us” David Patrick Stearns, Writer with Andante Magazine 2001

“And acoustically we do. The sound was glorious. Thick and rich and velvety, the music enveloped with an intimacy unlike anything I had ever experienced. From delicate whispers of woodwinds to thunderous percussive explosions, the sound resonated, crept and swept through the hall un-enhanced electronically — the finale of Stravinsky’s The Firebird heralding an orchestral sea change of near-biblical promise. Russell Johnson and his engineers from Artec are to be lauded for an outstanding acoustical engineering performance.” Harris Steinberg, Philadelphia Citypaper.net 2001
Conclusions

I compare my personal experience listening to the Philadelphia Orchestra as a long time affair since the days of Eugene Ormandy. I do recall my old vinyl recordings of his renditions on Beethoven and Brahms, when I was a kid. But not until Wolfgang Sawallisch stepped to the podium and we moved to Philadelphia my wife and I had the chance to attend to the old Academy of Music for two consecutive years. I became a devotee of the Orchestra and to my personal taste I did enjoy much the clear acoustic of the old hall – specially from the balconies- which felt totally fulfilling. Thus, I do accept the weak spots, specially on the lower main room.

But maybe I am more concerned now with the acoustic similarity between the Boston Symphony Hall and the Musikvereinssaal, which to me are notably similar. What is the role of acoustical science in both cases? I have to confess that I am disappointed myself with the result in the Kimmel Center and I do agree with the comments on size, shape, emptiness and low reverberation. Sound indeed seems “little” in the farther points of the hall. Is hard to believe that with such resources, both economical and technical, things failed so soundly.

Although it looked like a happily-ever-after-ending things did not go right in Verizon Concert Hall. The acoustician’s intention of fine-tuning the deficiencies perceived by a good percentage of the criticisms was not enough during these recent years. Not even the so-called “acoustical flexibility” was able to improve the hall sound. But perhaps he is not solely to be blamed, but the whimsical decision of the hall shape is. But the question is, why it was not predicted by the scientific advancement here described?

The acoustics of the concert hall have failed.

Among the reasons I would include to explain the failure are: an over confidence in sound prediction and control –science may have limits--; a wrong interaction in the design phase, including deciding the shape of the hall and lastly a total miscalculation of what today is considered “good sound” for the wide diversity of “ears”. When something like this
happens, could we rely upon science as we did before? Did Wallace Sabine really changed the way we should design concert halls in order to get “good sound”? How can we learn from this events?

One and a half years ago, just after Verizon Hall celebrated its fourth anniversary this note was published in the Philadelphia Inquirer.

“Philadelphia's Kimmel Center for the Performing Arts has been open for less than four years, but an internal report by the acoustic engineer of Verizon Hall, the center's main stage and the home of the Philadelphia Orchestra, suggests that a major interior renovation will likely be necessary to fix what are described as "serious acoustical problems." The hall has received mixed reviews from critics since its opening, but the concept of a major renovation is likely to face opposition, and debate has not even begun about who would pay for such a project”

XIX.

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