Interdisciplinary Translation: Sonic Practices as Pedagogical Tools in the Architecture Design Studio

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The relationship, or relationships, between the spatial practices (architecture and interior, urban, and landscape design) and the sonic practices (music and sound art) is at once fundamental to an understanding of both disciplines and complex, difficult, fleeting. Within architecture, in particular, sound is rarely considered beyond the exigencies of acoustic separation of one space from another or in the treatment of interior surfaces for purpose-built spaces of sonic performance. One could speculate on the reasons for the relative silence of architectural discourse: a radical disjunction between the ephemeral, transient, and inexpensive (often free) nature of sound and music and the heavy, more or less permanent, and often very expensive nature of architecture; the increasing disciplinary fragmentation of building in the modern world (which has pushed a consideration of sound in architecture into the domain of the specialist acoustic engineer); or the simple fact that architects draw – and it's awfully hard to draw sound.

Still, the fact remains that being in space (especially human-designed space) and both hearing and making sounds are two fundamental aspects of the human experience. Moreover, they are two aspects that in most instances happen simultaneously – no space is ever truly silent, and all sounds are made in a space of some kind. Sound and space therefore define a couple within which we carry out our lives. Music and Architecture, as disciplines concerned with the structure of sound and the structure of space, define a second such couple.

The history of these two couples has been sketched out by a number of authors, and will not be repeated here; the authors direct interested readers to the work of Ted Sheridan and Karen Van Lengen[1], R. Murray Schafer[2] and Juhani Pallasmaa[3], among others. A comprehensive study of this history remains to be completed. While there are a few architects actively experimenting with sound as a generator of form[4], the bulk of work recently produced which deals with sound and space comes from the disciplines of spatialized music and sound art; an investigation of space is clearly central to such works as Janet Cardiff and George Bures Miller's *40-Part Motet* or David Rokeby's *Central Nervous System.* The 'sound architect' Bernhard Leitner has spent the last three decades exploring the means by which sound can be used to shape space, starting with arrays of loudspeakers defining lines, arcs and planes to more complex, and more permanent, spatial installations.[5]

This paper will discuss a number of attempts at bringing the intensity and excitement of the work of these artists into the architectural design studio, as a pedagogical tool. Projects involving sound in the design studio are not particularly rare, although they are not perhaps standard practice in architecture schools. Sheridan and Van Lengen, in the work cited above, describe one project carried out at the University of Virginia, in which students were asked to formulate a design response to a space with a particular, and unusual, acoustic profile. In other studio projects we have encountered, students have

been asked to construct musical instruments, sometimes at the scale of inhabitable spaces. In the three projects to be discussed in some depth in this paper, carried out by students at the University of Waterloo and Ryerson University over the course of the last two years and under the supervision of the authors, the final product of the studio endeavour was always the design of a building of some programmatic complexity; however, the three projects present three distinct strategies of arriving at the architectural proposition, involving three distinct strategies for cross-disciplinary translation.

Common to all three projects were four primary pedagogical goals, against which we will be evaluating the results:

1. Add richness and context to the educational experience of the students by requiring contact with another cultural practice (music and/or sound art).

2. Divert students' attention from the traditional techniques of architectural composition and design to allow new ways of thinking about architecture to arise.

3. Encourage a development of analytical skills beyond formal and geometric analysis.

4. Through a consideration of sound, require students to confront the material reality of a spatial construct / building design.

Strategy One:
Direct Formal Translation

I call architecture frozen music.
- Goethe

The first strategy for the use of sonic practices within the architectural design studio involves the direct translation of music into architectural – ie, visual – form. Typically, some aspect of music, or to be more precise of either a particular piece of music or a particular genre, is submitted to an analysis which translates the sonic ideas into visual ideas. These visual ideas are then used to design, most commonly, a detail in the resulting building. Probably the best-known built precedent for this strategy is the windows at La Tourette, designed by the engineer and composer Iannis Xenakis. This strategy often involves not the sound of the music, but rather the score, which already provides a translation to visual terms.

As an example of this strategy, we will discuss the fourth-year independent studio project produced by Zhivka Hristova at Ryerson University in 2005-06. Zhivka choose to work through the issues of translating architecture into music through the design of a complex building – a centre for Canadian music, to be located in downtown Toronto. In addition to performance spaces, the program included a library and archives as well as a number of offices.

Rather than choosing a particular piece of music to work from, Zhivka elected to start from what she saw as a fundamental structure in music: the sonata form. In principle, this provided a significant amount of material for compositional play: two themes relating to each other through the structure of exposition, development, and recapitulation. Early conceptual models tended to concern themselves with this ABA structure, assigning a similar structure to movement through the building; the question of the two themes was, perhaps unfortunately, not addressed until quite late in the design process. Perhaps as a result, the potential present in the parti of a bipartite division of both program and form never really achieved a strong conceptual development, and the musical ideas, for the most part, were limited to the area of the performance spaces and their lobbies. In the end the two themes were largely present only in the structure of the roof over the lobbies, and resolved into a dialogue between macro- and micro-structural members, transparent and opaque panels.

The use of music in the project never developed beyond the level of analogy; while musical ideas may have been transliterated into visual and perhaps structural ideas, they never really achieved the translation into architecture. Furthermore, the imposition of musical concepts, rather than assisting in the design of the building, tended to get in the way: Zhivka was never really able, for example, to move beyond the linear temporal nature of the sonata form to a consideration of three spatial dimensions.

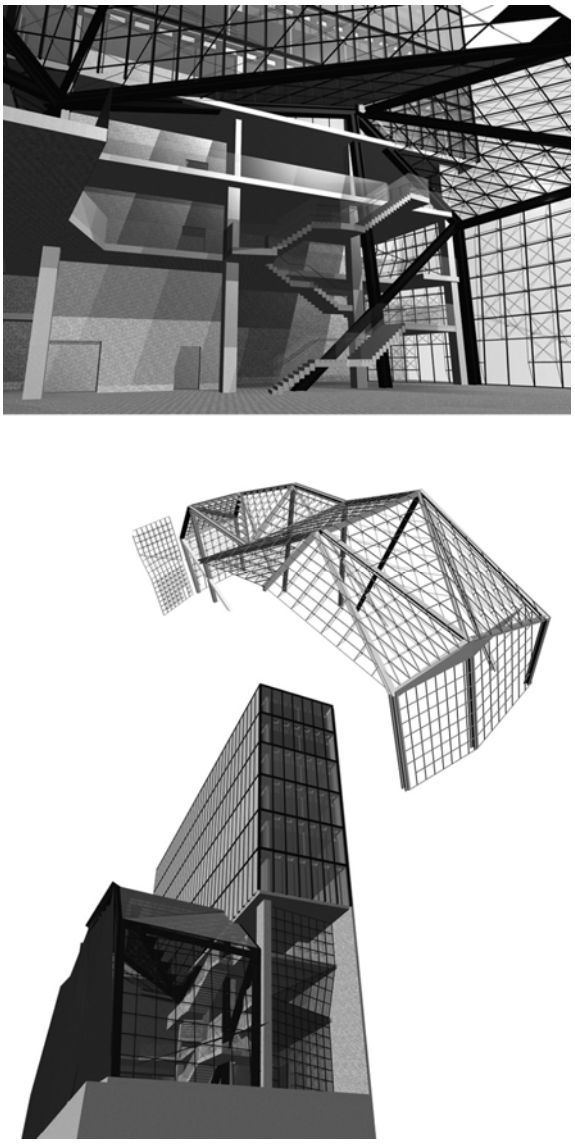

Figure 1. Canadian Music Centre, student project, Zhivka Hristova, 2005-06.

Although some of the issues raised here are specific to the particular project, they also point to fundamental flaws in the strategy, flaws which limit the extent to which it can be successfully used as a design tool. To put it succinctly, this strategy is always one about music, not about architecture. The designer is not taken out of traditional means of architectural design and composition – these remain intact, often even uninflected. Instead, these traditional architectural techniques are used to present musical ideas; the building becomes either a sort of three-dimensional score, or an essay about musical form. The analyses presented, although carried out on musical material, are typical architectural analyses of form and structure; they lead to typical architectural syntheses of abstract form, with no particular need to engage in the building as a concrete material reality. Thus, although the first of our pedagogical goals was satisfied – Zhivka came to learn a fair amount about music through the process – we must conclude that this strategy was not successful for our other three goals.

Strategy Two:
Engaging with sound

Buildings do not react to our gaze, but they do return our sound back to our ears.
-Juhani Pallasmaa

The second strategy to be discussed in this paper is to use the sonic properties of a building proposal as compositional material. The objective is to engage in sound directly, rather than through a process of translation. The sounds made by a building – and by inhabitants of the building – and the means by which the various spaces and components of the building amplify, distort, isolate, or otherwise manipulate these sounds, becomes the ground for design decisions. One often cited example of this strategy involves the relationship between plainchant and the volumetric and material properties of a gothic cathedral. In more recent times, this strategy owes much to the acoustic ecology movement as pioneered by R. Murray Schafer, and his related concept of *soundscape* design. Only rarely has this concept been realized in architectural work, beyond the mere pragmatic; most precedents available to students come from the world of sound art.

As an example for this strategy, we will examine another project from the same Ryerson fourth year studio as discussed above, and one which started from a very similar programmatic position. In this case, however, the student, Saman Soleimani-Deilamani, chose to start not from the question of music, but from that of sound. Thinking the design of the project through sound proved to be very useful in the early stages of the project. In order to make use of and encourage the development of the vibrant street life adjacent to the chosen site, Sam decided to push the bulk of his program to the back of the site in a thin slab building, and

underground, in order to maintain a public square, giving ample space for the buskers and hawkers of wares to make their noises. This exterior space was also enlivened by adjacent bar and café (and streetcar) sounds, while more acoustically sensitive program space was located in the quietest parts of the site.

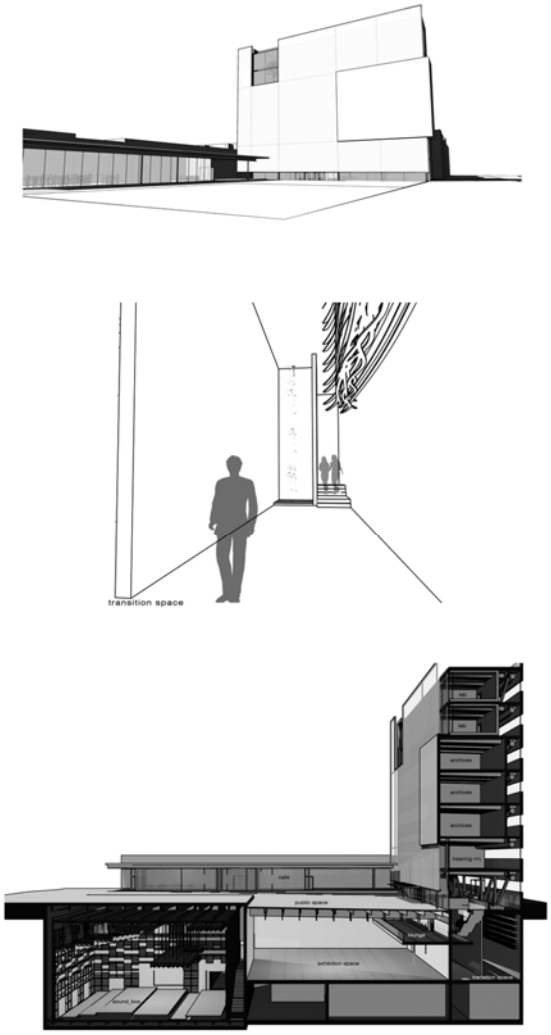

Figure 2. Sound_Box. Student Project, Saman Soleimani-Deilamani, 2005-06.

Thinking through sound also started to inform the arrangement and form of spaces within the building. The process, for example, from the square, through the lobby in the slab building, and down to the exhibition and performance areas, is made up of a series of spaces of relatively carefully controlled acoustic characteristics. The necessity of confronting the spatial and material makeup of these spaces, in order to control the acoustic qualities, provided a valuable pedagogical experience. This also pushed Sam out of the typical plan-and-section compositional method and forced him to think spatially – simultaneously engaging three dimensions, time, and the aural.

However, in the end (and from my experience this is typical of projects which take this strategy, including my own work), the design solutions fall back on gadgetry and special effects. Spatial solutions tended to extremes: tall, thin, reverberant spaces; extremely quiet spaces; spaces with unexpected sonic linkages to other spaces; spaces in which expected sonic linkages are absent. Sam spent a significant amount of time, for example, researching and detailing the glass wall of a bar, in order to maximize its STC rating, with the aim of creating a disjunction between the visual connection and sonic separation between square and bar. This tendency to extremes could be a result of the relative novelty of this way of thinking for architects, and the concomitant inability to understand subtle acoustic changes. It may also be the result of using as the main source of references the work of sound artists, whose work naturally deals with both gadgets and unexpected conditions.

This tendency may also be, at least in part, the result of the biggest problem Sam faced in carrying out his project: the difficulty of representing the acoustic and sonic character of the spaces he was designing. Sam did try to use sound to represent the spaces. He went to some lengths to try to develop a soundtrack to accompany a walk-through of the project; unfortunately, the facility with the medium was not reached at a high enough level to be useful. As a result, Sam was left with the onerous task of trying to explain sonic ideas through visual means.

Strategy Three:
Intuition and Iteration: Material Translation of Interpretive Content

Anyone who has become entranced by the sound of water drops in the darkness of a ruin can attest to the extraordinary capacity of the ear to carve a volume into the void of darkness. The space traced by the ear becomes a cavity sculpted in the interior of the mind.

-Juhani Pallasmaa

The third strategy, insofar as one can refer to this set of discursive pedagogical techniques as a strategy, begins again with a particular sonic passage, and positions designers as *hunters* – excavating the substance of a musical piece to extract an aspect of its essence, then, working in an iterative mode through direct material and spatial manipulation translating the resonant aspects of the source material into a material and spatial construct.

Work described was undertaken as part of a core third year undergraduate design studio at the University of Waterloo and involved some 65 students. The term was divided into successive projects including the first exercise, described here, intensive case studies, a series of field visits and acoustic seminars led by Raj Patel of Arup Acoustics in NYC, and a final term project for the design of the Canadian Centre for Sonic Art, a public performance hall, and sonic research lab located in an urban context.

The initial project, *Aeolian Vessel* called for students to form into groups of three and then select through lottery, one of 24 sonic passages,[6] the proposition was outlined as follows.

> *Each of you must find a space in which you can be solitary and focused - free from the distractions of your surroundings. Now, listen. Listen to the piece and enter it. Trace its arc from its first breath and inhabit the fullness of its volume. You are hunting for an essence. You are hunting for a particular passage within the piece that invites your occupation. Select a particular passage from within the body of the recording (8-20 seconds in length), upon which you will focus your attention. Now, re-enter the space of this selected passage and imagine its volume. Visit and revisit this place suggested by sound. Give this place a name. Using the techniques of collage and montage, draw the volume of this passage in colour. Return to the group and share your discoveries.*

Students were asked to begin by attempting to draw the space evoked by the passage, and then worked in an iterative mode, critiquing the work of their group, revisiting the piece, distilling both the selection of the sonic segment and their increasingly collective response to it. Two dimensional drawn work provoked a response in three dimensions,

> *Working as a group with a single sound passage, construct an Aeolian Vessel - a spatial volume translating the sound into space. Design and build the artifact so that it is capable of being viewed simultaneously as an object and an interior. Carefully select a material palette and construction method/technique for the Vessel appropriate to your sound passage, so that it can be read as both a material and spatial embodiment of the musical piece. Work to develop the vessel through making. Test and retest the Vessel through built propositions. An iterative process is necessary to find the final piece.*

The notion of translation from one language to another is an understood concept when we consider written or verbal communication. As architects / designers / artists, we are constantly required to translate between the abstract or conceptual and the concrete, in order to bring our intentions into being. Indeed, all artistic production involves the translation of an idea or feeling into a form that speaks to others[7]. This task of translation inevitably requires both intuition and instrumentality.

> *We will translate sound into space. What type of space does the sonic passage evoke? How does the dimension of sound reach into, trace, or define a volume? How can space expand and contract in response to the rush of a breath? How can the properties of the sound passage provoke its spatial counterpart? Rigorously consider its structure and form. Consider the rhythm, cadence, pitch and tone of the piece. How is movement created by and inflected within the piece? How can this passage of sound be translated into space?*

Having set this problem without any preconceived idea as to what the physical qualities of the *Aeolian Vessel* might be like, the range of responses to this first proposition was, for our studio faculty, in fact quite astonishing. Students were only limited in that each *Vessel* was limited to a cubic volume of

400mmx400mmx900mm, configured as desired. A variety of methodologies for the translation, from the most intuitive and primal, to more analytical approaches emerged. Within the work of each group, however, the prescribed technique of response, repose, reflection and then lateral realignment and response was emphasized.

One group began by describing a state of suspension, animated by shimmering light in response to the ethereal work of Dejohnette's piece *Gateway*. They began struggling with questions of formlessness, first constructing a vessel of smoke, and then later conducting a series of experiments introducing India ink into a volume of water to recreate physically, the sense of *suspended intermingling* they intuited from the work. In an attempt to capture the form of these studies, they began to analyze the relative density of video footage they had captured of these their experiments, and attempted to configure the coordinate spatially using 3d modeling software translating the visual density of each pixel of the video frame into a Cartesian coordinate.

Immediately, they were faced with the *crisis of the object* and with the difficulty of translation of the *aural* into *form*. Their initial attempts produced these irregular object forms, that by virtue of their fixity, and object quality, failed to capture the temporal and shifting negative space of their video studies. Eventually, they began to model the inverse of the solid as a void, and began to work with ice, as a material that might permit the figural to shift with time, as the material changed states. They then set about casting some forty sheets of ice, scoring the figure of the analytical model into each sheet, so that as they were assembled, and activated with light, the space of the vessel would emerge.

In a very different mode, another group, whose musical interval was sampled from Blanchard's *Strike Leaves Town,* began with the attempt to express the sense of a deep aching that they found in the piece - an empty, but expectant core that initially could only be approached by modeling its inverse. Rather than deploying an instrumental technique through which to filter their translation, they worked in the manner of sculptors, slowly working and reworking the piece at differing scales and materials, understanding that they were constructing the formwork for an interior. They then cast the clay model in plaster and began to work with pigment, shaping and texturing the surfaces. The final piece was remarkable in that it resonated both at the level of an interior chamber with its own sonic qualities, but also as a piece that invited the caress of the hand – its plaster surface having taken on the quality and depth of flesh.

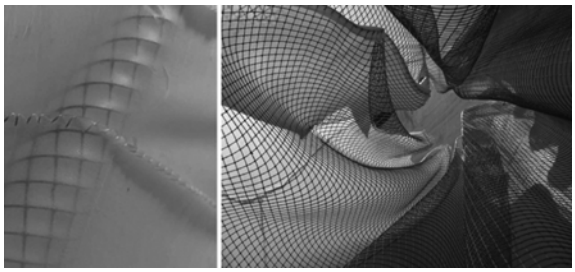

Figure 3. In response to *Fratres* by Arvo Part: Image of final vessel in blackened steel mesh and cast latex (Beaulieu, Graham, Hashimoto, Patterson)

Other groups worked with various skins of latex and mesh (figure 3), and facetted metallic textiles. One group imagined the condition of interiority formed by the undulations of a vast illuminated array – a landscape evoked by sound (figure 4). Another worked with a complex system of finely woven and stitched veils, activating the interior of their *Vessel* through projected light. Others used their own bodies as formwork, creating a *Vessel* of flayed golden skins – of beeswax. The music of Paul D Miller *aka* DJ Spooky was responded to by the exploration of the interstitial space between a skin of 'tripe' and its plaster cast negative, a most unusual material choice, but with surprisingly compelling results (figure 5).

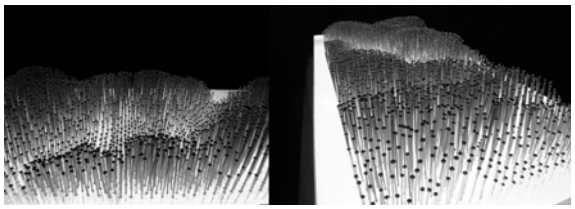

Figure 4. Luminous interior at *landscape* array in response to *Montego Bay Spleen* by St. Germain. Steel, paraffin wax, black walnut, incandescent luminare. (Kalfakis, Kalt, Navrady)

Each of these approaches was seen to be a valid response to its particular piece, in that it

had originated in relation to the provocation of the work, and through its discussion and refinement had evolved in close relation to the original sonic sample. Rather than prescribing a methodology, the studio emphasized a process of attentive evaluation, looking for that which was most compelling, or alive within each proposition to define a way of moving the work ahead.

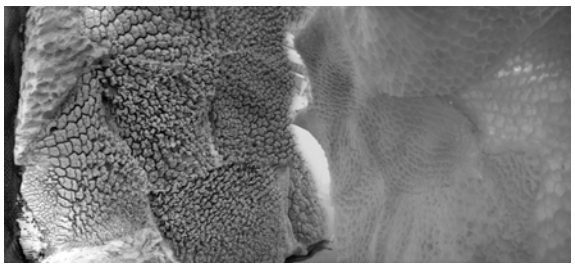

Figure 5. Paul D Miller aka DJ Spooky's *Nodal Flux* provoked this exploration of the interstitial between a suspended skin of tripe and its other in cast plaster. (Harris-Brandts, Horwood, Maemura)

The intention of structuring the first exercise as a relatively unencumbered and experimental project served well to avoid some of the tendencies described in the previous strategies and reinforced the discursive, iterative and generative nature of design studio culture. The resulting work provided a deep resource on which the studio members could draw in developing future projects.

In the end, however, although the technical dimensions of subsequent exercises did provide a useful set of core competencies from which to draw upon in the final building and public space design project, confidence in the relevance of utilizing the source material from this exercise seemed to diminish as the anxiety associated with articulating the term project loomed. The pedagogical structure did not explicitly demand that the link be made, and in retrospect, making the inclusion of preliminary experimentation legible in the final proposition may have assisted in a greater degree of experimentation within the final building designs. That said, it is fair to say that with respect to the four pedagogical goals outlined at the outset of this paper, the studio seemed to be relatively successful, and as with many educational experiments, the true effects of such an experience are likely to emerge slowly over time.

The authors recognize the necessity of this kind of reflection, not only in the gestation of our students, but for ourselves as educators. Interestingly, the simultaneous pursuit of these initiatives and pedagogic probes have paralleled a period of increased collaboration and academic exploration and improvisation between our respective institutions, our students, and ourselves. A recent conference hosted by Ryerson University to explore these and other questions engaging spatial and sonic practices and their possible interrelations drew international colleagues deeper into this territory, and has further propelled the discussion.

The notion of the trans-, or cross–disciplinary fertilization of design education with parallel practices is indeed rich – not only for what it might bring to the discourse within a studio, but perhaps more importantly, what it may help engender within the broader community in which we work, think and make.

The authors would like to acknowledge and thank Zhivka Hristova, Saman Soleimani-Deilamani, and all the students who participated in the University of Waterloo School of Architecture 3A studio, 2005.

Endnotes

[1] Sheridan, Ted, Van Lengen, Karen, "Hearing Architecture: Exploring and Designing the Aural Environment", Part I, *Journal of Architectural Education* 2003 Vol. 57 No. 2 pp 37-44.

[2] R. Murray Schafer, *The Tuning of the World: Toward a Theory of Soundscape Design*, Paperback ed. (Philadelphia: University of Pennsylvania Press, 1980).

[3] Juhani Pallasmaa, *The Eyes of the Skin: Architecture and the Senses* (Hoboken, NJ: Wiley-Academy; John Wiley & Sons, 2005).

[4] See for example, Ben Rubin, Joel Sanders, and Karen Van Lengen, "Stuated Sonic Practices", in *Architecture|Music|Acoustics: Proceedings of the 2006 Conference*, eds. C. Ripley, M. Polo, A. Wrigglesworth (Toronto: REAL, 2006), p. 60.

[5] For a further discussion of spatial sound art, see Brandon LaBelle, *Background Noise: Perspectives on Sound Art* (New York and London: Continuum, 2006).

[6] For a detailed description of the studio outline, sonic passages, and record of studio work produced, see Geoffrey Thün “Translation and Permission,” in *Architecture|Music|Acoustics: Proceedings of the 2006 Conference*, eds. C. Ripley, M. Polo, A. Wrigglesworth (Toronto: REAL, 2006), p. 69.

[7] For an extensive discussion of this proposition, see Langer, Susan K. in particular, Chapter 9, “The Living Work” *Feeling and Form A theory of Art developed from Philosophy in an New Key* (New York: Charles Scribner’s Sons, 1953) pp 133-148.