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Visualiser l'espace acoustique

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Résumé de l'article

Cet article explore le concept d'espace acoustique en relation avec les études des médias de l'après-guerre, l'architecture et la composition de musique spatialisée. Le lien entre ces différentes approches est la tendance à définir l'espace acoustique comme indéterminé, chaotique et sensuel, par opposition à un espace visuel défini, ordonné et rationnel. Ces polarisations conceptuelles étaient soulignées à grands traits dans l'installation son et lumière du Pavillon Philips à l'Exposition universelle de Bruxelles de 1958. On trouvait au Pavillon Philips, conçu par Le Corbusier, une projection de films en noir et blanc, des projections de couleurs, des sculptures suspendues et le Poème électronique d'Edgard Varèse, une composition musicale spatialisée diffusée par des centaines de haut-parleurs disséminés dans le Pavillon. Si on l'a souvent décrit comme une suite d'abstractions sonores, l'auteur prétend plutôt que le Poème électronique était au contraire une oeuvre allégorique racontant une « histoire de l'espèce humaine ». Ce récit s'exprimait à travers une série de concepts binaires juxtaposant des catégories telles que primitif/évolué, femelle/mâle, sensuel/rationnel – des contrastes qu s'inscrivaient dans la dialectique plus large entre espaces acoustique et visuel.

Visualizing Acoustic Space

Gascia Ouzounian

Prendre possession de l'espace est le geste premier des vivants, des hommes et des bêtes, des plantes et des nuages, manifestation fondamentale d'équilibre et de durée. La preuve première d'existence, c'est d'occuper l'espace.

–Le Corbusier

In the decade following the Second World War, "taking possession of space" became an increasingly pressing concern within the Western musical avant-garde. Traditional musical considerations, such as the organization of pitch, rhythm, harmony, and form, were supplanted by spatial considerations, such as the arrangement of performers inside an auditorium, and the ability to channel sound electronically to and between multiple loudspeakers. A vocabulary of space emerged in relation to musical forms and processes, one that was inextricably tied to languages of control and territorialization. Efforts to spatialize sound – to determine the location and movement of sounds within architectural space – often communicated larger concerns over the "place" of music within Western societies, and the ability of music to produce and accumulate cultural capital.

Inquiry into the realm of acoustic space during the postwar era, however, was not reserved to musical fields of production. In the mid-1950s, the Canadian media theorists Marshall McLuhan and Edmund Carpenter proposed the binary concepts of "acoustic space" and "visual space" to describe the perceptual structures governing, respectively, "the mentality of the pre-literate" and the Western imagination (McLuhan, 1960, p. 207).[1] They conceived of acoustic space as a dark, chaotic foil to an enlightened and orderly visual space that had dominated Western thought since Greek phonetic literacy. While visual space was definite and linear, acoustic space was "boundless, directionless, horizonless, the dark of the mind, the world of emotion, primordial intuition, terror" (McLuhan, 1960, p. 207). McLuhan

1. Carpenter and McLuhan co-authored the article "Acoustic Space," originally published in Carpenter's journal *Explorations in Communication* in 1953. They revisited concepts developed in "Acoustic Space" in a co-written introduction to an anthology of articles from the journal (Carpenter and McLuhan, 1960), and explored these ideas independently (McLuhan, 1960; McLuhan and Powers, 1989).

and Carpenter posited that the proliferation of non-literary electronic media (TV and radio) would return the Western imagination to the realm of acoustic space, "where the Eskimo now lives" (McLuhan, 1960, p. 207). They celebrated this reinvigorated acoustic sensibility as a re-tribalization of Western civilization within a common "global village" (Carpenter and McLuhan, 1960, p. xi).

While reductive and essentializing, McLuhan's and Carpenter's theories provide a unique lens through which to consider early spatial music composition, which often conflated concepts of acoustic space with sensorial immersion, ritual practice, and primitivism. This paper revisits an iconic sound-and-light installation, the Philips Pavilion at the 1958 Brussels World Fair, examining the ways in which concepts of acoustic and visual space were negotiated within it. The Philips Pavilion was an eight-minute long multimedia spectacle conceived of by the architect Le Corbusier as combining "sound, light, color, rhythm" in the form of an electronic poem (Petit, 1958, p.23). Le Corbusier acted as the pavilion's artistic director and provided the conceptual framework for the poem. The French-born, N.Y.C.-based composer Edgard Varèse contributed *Poème électronique*, the spatial music projected over hundreds of loudspeakers and multiple "sound routes" during the spectacle's main portion. Le Corbusier's assistant Iannis Xenakis designed and implemented the pavilion's exterior architecture and composed a two-minute interlude, *Concret PH*, during which time audiences were ushered in and out of the pavilion. The pavilion also featured a film prepared by the Italian filmmakers Jean Petit and Philippe Agnostini according to Le Corbusier's directions, as well as an elaborate lighting scheme, color projections, and hanging sculptures.

The following discussion of the Philips Pavilion focuses on the multimedia interactions that took place within it, and the story behind them: a literal narrative that was figured in all the different elements of the pavilion, including, I argue, its music. Conceived of by Le Corbusier as a "story of all humankind," this narrative fit within the Brussels World Fair's modernist theme of "Man and Progress." It depicted the evolution of humankind from so-called primitive societies to the Nuclear Age through a series of juxtapositions that contrasted the intuitive with the rational, the emotional with the logical, and the primitive with the advanced. Like so many stories dreamed up for the utopian, celebratory atmospheres of World Fairs, this story had a happy ending. In its final moments, it predicted something akin to McLuhan's global village: a one-nation world in which an enlightened and unified humankind had transcended its primitive desires and nuclear ambitions.

In tying Varèse's music to this larger narrative scheme, my discussion of *Poème électronique* diverges in important ways from existing accounts, which frame it as an independent composition related only in structural ways to the rest of the Philips Pavilion. Conversely, I suggest that Varèse's music was an integral part of the multimedia scheme, that it performed the "story of all humankind" as coherently as the other media. Using McLuhan's and Carpenter's conceptual polarities, I argue that *Poème électronique* was not merely an abstract sequence of sound geometries, but instead a calculated negotiation of acoustic and visual space, locating the acoustic in the field of the sensual, the primitive, and the illegible. This negotiation spoke volumes about the historical moment in which it was born, and its terms were much more urgent than merely determining the physical location of sounds.

Spatial Music and *Espace acoustique*

I am a musician by heart.
–Le Corbusier

When magnetic tape became commercially available after the Second World War, it became newly possible to create a "spatial music." Tape suggested an equivalency between time and space in the medium of sound, since musical time could now be measured in terms of distance (the length of tape). Composers sought to exploit this newfound plasticity of sonic materials, and many reconfigured their practice within a language and aesthetics of sculpture. Pierre Schaeffer, the director of the electronic music studio at the *Radiodiffusion Française* in Paris, introduced the term "*musique concrète*" in 1948 in order to describe music that resides in a fixed medium like disc or tape. He designated "*l'objet sonore*" (the sonorous object) the basic element of *musique concrète*, and developed a compositional vocabulary that took into account this newfound "object-hood" of sound.[2] Concurrently, composer-engineers at his studio developed new technological devices which could locate and route sonorous objects, like other objects, within architectural space.[3]

Edgard Varèse, who undertook a residency at the *Radiodiffusion Française* in 1954, made critical contributions to this emerging object-based, spatialized musical aesthetics.[4] Since the 1930s, Varèse had dreamt of "new devices that would make spatial music possible" (Alcopley, 1968, p. 195), and his efforts are widely considered to have "provided the inspiration for the idea of sound in motion, comparatively rare as a compositional element in pre-Varèsian music" (Strawn, 1978, p. 141). Varèse understood space in scientific

2. For example, Schaeffer suggested an *écoute reduite* with respect to *musique concrète*, a method of "reduced listening" in which listeners were supposed to mentally abstract sonorous objects from their real-world sources in order to hear them as abstract musical forms.

3. Schaeffer's technical assistant Jacques Poullin developed the *pupitre d'espace* in 1951, a device which could route sound from five-track tape to five loudspeakers. The sound routes of four of the tracks were predetermined, while that of the fifth was improvised by a performer who played the *pupitre d'espace* in concert.

4. Schaeffer invited Varèse to Paris to create the tape parts for his composition *Déserts* (1952-1954), which had the distinction of being the first composition to be broadcast live in stereophonic sound over French radio. Listeners at home acquired two radio sets and tuned-in to two different stations in order to hear the stereophonic effects.

and rational terms, and sought to confer these dimensions to a disorderly and chaotic acoustic space, imagining that acoustical structures could operate as abstract geometrical forms within a definite, Euclidean space. This proposed rationalization of sound space would, among other things, assure the status of music as an "art-science" (cf. Varèse, 1936, and Wen-Chung, 1966). According to Varèse:

> De nos jours, avec les moyens techniques existants et facilement adaptables, la différenciation des diverses masses et des différents plans ainsi que la présence de ces rayons sonores peuvent être perceptibles par l'auditeur grâce à quelques aménagements acoustiques.
>
> […]
>
> Vous serez conscient des transmutations des masses en mouvement quand elles traverseront différentes couches, quand elles pénétreront certaines opacités, ou quand elles seront dilatés dans certaines raréfactions. (Varèse, 1936, p. n/a)

Varèse frequently spoke of "liberating" Western music from its traditional confines: its emphasis on melodic development, its tonal harmonic languages, its equal temperament systems . Most urgently, he sought to liberate music from its stationary perspectives, such that it would emit a sense of "sound-projection in space" (Varèse, 1936, p.19). He imagined himself as adding a "fourth dimension" to musical composition that would achieve this task, writing:

> La musique, aujourd'hui, connaît trois dimensions: une horizontale, une verticale, et un mouvement de croissance et de décroissance. Je pourrais en ajouter une quatrième, la projection sonore (cette impression que le son nous quitte avec l'idée qu'il ne reviendra pas, une impression qui ressemble à ce qui émerge des rayons lumineux émis par un puissant projecteur): un sentiment de projection, de voyage dans l'espace, pour l'oreille comme pour l'œil. (Varèse, 1936, p. n/a.)

It was not until the Philips Pavilion commission, however, that Varèse had at his disposal the means to realize this musical "fourth dimension," transferring to the ear that artificial vanishing perspective that had previously been reserved for the eye. The Philips Corporation provided Varèse with a studio in Eindhoven and a team of engineers dedicated to achieving the music's synthesis and spatial distribution. Information determining the music's spatialization was encoded, along with the sound objects and their "special effects" (reverberation, etc.) onto several sets of multi-track tape (cf. Tak, 1958). Nine sound routes determined the music's trajectory between 300 and 450 loudspeakers, producing an unprecedented corporeality of, and immersion within, electroacoustic music.[5] "Intense spine-tingling reverberations overwhelm you as the sound impinges on you from all directions at

5. The exact number of loudspeakers inside the Philips Pavilion is disputed ; most sources place the figure between 300 and 450.

once, only to numb you in turn with extremely high shrieking, whistling eerie echoes," wrote one critic (Gernsback, 1958, p. 47). Another suggested that, "One no longer hears the sounds, one finds oneself literally in the heart of the sound source. One does not listen to the sound, one lives it" (J.O., 1958, p. n/a).

Heralded as a "*Rite of Spring*, but 1958," *Poème électronique* is one of only a handful of spatial electroacoustic compositions to have navigated entry into the Western musical canon (Trieb, 1996, p. 217). It assured Varèse's status among the leading composers of the century, a position that was somewhat tenuous upon its creation, when Varèse had only recently emerged from a drawn-out "silent period" (Mattis, 1992, p. 558).[6] The music remains in wide circulation, with several re-mastered stereophonic recordings issued on compact disc since the 1990s.[7]

Despite its scale and significance, however, *Poème électronique* was only one element within a much larger, stunningly elaborate multimedia work. The *Gesamtkunstwerk* that Le Corbusier had imagined for the Philips Pavilion featured not only Varèse's spatial music and its extravagant projection system, but also a black-and-white film (a "luminous poem") projected simultaneously onto the two curved interior walls of the Pavilion, "*ambiences*," or washes of colored light that created atmospheric effects and effectively colored the film, "*tri-trous*," intense beams of colored light projected from a mottled, opaque film strip, and "*volumes*," fluorescent sculptures that hung from the Pavilion's ceiling.[8]

In conceptualizing the Philips Pavilion as a "synthesis of the arts," Le Corbusier had something akin to Varèse's fourth dimension of music in mind: a "fourth dimension" of architecture, in which the "harmonious orchestration" of objects and environments caused structures themselves to "call out to space" (Pearson, 1997, p. 178). Le Corbusier wrote of this transcendent fourth dimension that, "La quatrième dimension semble être le moment d'évasion illimitée provoquée par une consonance exceptionnelle juste des moyens plastiques mis en œuvre et par eux déclenchée. (Le Corbusier, 1946, p. n/a). He termed this fourth dimension of space an *espace acoustique*:

> Depuis longtemps, j'ai pensé qu'en certains lieux de l'architecture (dedans et dehors), lieux que j'ai qualifies d'*acoustiques* (parce qu'ils sont les foyers réagissant des espaces), les grands formes faites des surfaces gauches d'une géométrie intelligente pourraient habiter nos grandes bâtisses de béton, de fer, ou de verre… Devant les bâtisses, à leur flanc ou sur leur front, les formes en appelleraient à l'espace. (Le Corbusier quoted in Pearson, 1997, p.178.)

6. Mattis (1992) points out that Varèse had all but "vanished from the musical scene" and published "not a note" for almost twenty years after the 1936 premiere of his *Density 21.5* (Mattis, 1992, p. 558).

7. See Cabrera (1994) for a critical discussion of different stereophonic versions of *Poème électronique*.

8. See Trieb (1996) for a comprehensive design chronicle of the Philips Pavilion.

Le Corbusier's use of the term "acoustic" did not refer to audible phenomena, but rather to the "miraculous" ability of magically-proportioned structures to visually "resonate" within their surroundings (Le Corbusier, 1946, p. 66). The Philips Pavilion was therefore intended to be an *espace acoustique*: a space in which the interrelationship of media forms produced "a phenomenon of concordance […] as exact as mathematics, a true manifestation of plastic acoustics » (Le Corbusier, 1946, p. 66).

The Philips Pavilion: Negotiations of Acoustic and Visual Space

> Music has its place in the company of mathematics, geometry, and astronomy.
> –Edgard Varèse

The media interactions inside the Pavilion were fortuitous, chanced – complex relationships that were not pre-determined and could not have been predicted before the pavilion's unveiling. The different media had been prepared in isolation, there was no scripted relationship between them, and their respective authors retained creative control over their individual contributions.

Still, not everything was left to chance. The scenario conceptually tying together the different elements of the pavilion, Le Corbusier's "story of all humankind," was unambiguous and very much pre-scripted. It depicted the evolution of humankind, constructing a non-chronological history out of a series of dichotomies that contrasted the primitive with the advanced, the intuitive with the rational, and the emotional with logical. These juxtapositions were framed within the larger dialectic "that had always existed in [Le Corbusier's] thought between the creative intuition of art… and the geometric rationalism governing architecture" (Ockman, 1993, p. 64). In the most blatant example of these binary categories, the *volumes* that hung at the pavilion's apex contrasted a "mathematical object," which represented logic and rationality, with a naked female form.

The pavilion's luminous and sonorous poems performed similarly reductive tropes, although they relied on a somewhat more complex vocabulary to do so. The film was divided into seven minute-long segments: Genesis, Matter and Spirit, From Darkness to Dawn, Manmade Gods, How Time Molds Civilization, Harmony, and To All Mankind. Each was a montage of black-and-white images which were coloured by the *tri-trous* and the *ambiances* (these were co-ordinated with the film). In Genesis, which follows the Biblical story of Adam and Eve, Adam takes the shape of a young toreador bathed in a sensual red light, his figure set opposite that of a bull's in a rhythmic interplay of forms. Contrasting this, God appears as an ancient Greek statue, a still, floating head washed in the pale blue light of wisdom. Eve, a

foil to these symbols of male power and authority, is a half-naked Hollywood starlet, her body a series of soft curves and textures, her whiter-than-white skin luminescent and unadulterated by color.

The next segment, Matter and Spirit, is constructed around a similar grouping of opposites. Old white men in suits and eyeglasses are assembled around an object, marvelling at their creation. A modern version of God and a symbol of rationality, they are set in the same blue light that coloured the ancient Greek statue. Their image is interrupted by that of a female African goddess, who is set in a polyphony of colors. Just as Eve's femininity was constructed in opposition to power and authority in the opening frames, primitivity is figured in opposition to whiteness and modernity in the film. The black goddess, with its protruding breasts and fantastic headdress, symbolizes mythology, sensation, and tribal culture, whereas whiteness appears throughout the film in association with power, knowledge, technology, and purity. On a conceptual level, the black goddess is no different from the images that are grouped with hers: a rapid succession of apes, dinosaur skeletons, and tribal drawings.

The film progresses along a similar series of juxtapositions until the final segment, *To All Mankind*, in which Le Corbusier's architectural designs emerge as an "alternative" to this history of conflicting forms. We see his *Modular Man*–a rendering of the human body into "perfect" proportions–and his modular architectures, washed in a magenta light that signals transcendence. Children of different ethnicities appear united in a single frame, signalling their transcendence from humankind's tribal roots. The final image is of a white baby drenched in a rainbow of colors. These colors have illuminated the "story of all humankind" and have thus come to symbolize history itself. The rainbow-coloured baby is the newest possible form, and a repository of all historical forms; it is a symbol of the unified and enlightened civilization that will conceivably inhabit Le Corbusier's reasoned structures.

Le Corbusier had given Varèse a carte blanche with respect to composing *Poème électronique*, but he also provided Varèse with the filmic scenario, which was in Varèse's possession when he set about working on the music (Trieb, 1996, p. 104). In *Poème électronique*, oppositionality is manifested as extreme contrasts in: frequency, register, amplitude, consonance, duration, rhythmic regularity, multiplicity of voices, location and movement of sounds in space, and the rate of change of all of these. The music opens with the rhythmic striking of a gong, abundant and resonant, with long, natural decays that fill the entire auditory field. This is quickly contrasted by a sequence of electronic attacks that peppers the auditory field in regular and irregular

rhythms, at contrasting amplitudes and rates of decay. These percussive attacks are then immediately submerged by multiple, sustained sirens that sweep across the sound space, rising and falling dramatically in frequency and amplitude. Contrasting these rapid flows, a regular electronic pulse enters and slowly fades away, layered by multiple sine tones and electronic buzzes that pan quickly from side to side. Shattering glass, a quasi-linguistic electronic quacking, and a major-second electronic glissando– a motif that appears throughout the piece– appear and disappear in quick succession. All of this happens in the first minute of the music.

Varèse's music is often analyzed in terms of its evolution as opposing forms, an interpretation which Varèse himself would have supported (cf. Cogan, 1991). Varèse had claimed, for example, that rhythm in his music was derived through "the simultaneous interplay of unrelated elements," and that form was a function of the interaction of "different shapes or groups of sound constantly changing in shape, direction, and speed, attracted and repulsed by various forces" (Alcopley, 1968, p. 190-191). In *Poème électronique*, however, these opposing forces were not only measured in terms of the strictly acoustic qualities of sounds, but also in terms of their ability to negotiate acoustic (sensed) and visual (structured) modes of perception.

In their binary theories of acoustic and visual space, Marshall McLuhan and Edmund Carpenter drew on the same conceptual dichotomies that structured the Philips Pavilion. They argued that, in atomizing the word, Greek phonetic literacy had ordered the Western "visual bias" along the axioms of Euclidean geometry, in which objects are fixed in a definite and linear ordering. Conversely, they claimed that acoustic space had no central focus or vanishing perspective. It was a "sphere without fixed boundaries," dynamic and "always in flux" (Carpenter and McLuhan, 1960, p. 67). While McLuhan and Carpenter associated visual space with modern, literate, Western societies, they reserved acoustic space for describing the perceptual structures of pre-modern and Non-Western societies. McLuhan wrote that, "For the caveman, the mountain Greek, the Indian hunter (indeed, even for the latter-day Manchu Chinese), the world was multicentered and reverberating […]. Acoustic space is a dwelling place for anyone who has not been conquered by the one-at-a-time, uniform ethos of the alphabet. It exists in the Third World and vast areas of the Middle East, Russia, and the South Pacific" (McLuhan, 2004, p. 68). McLuhan's and Carpenter's binary construction of acoustic and visual space excluded possibilities of perceptual convergence or overlap, reducing perception to a binary system of well-worn conceptual and cultural tropes.

This oppositional construction of visual and acoustic space was apparent across the elements of the Philips Pavilion, and most notably, in its music. In *Poème électronique*, Varèse contrasts strictly synthesized, abstract sounds with *concrète* recordings loaded with meaning. The synthesized sounds are "rational" forms that function as aural analogies to visual structures. The electronic sirens that appear throughout the piece, for example, are a musical representation of the hyperbolic paraboloid curves that formed the Philips Pavilion's exterior architecture (Alcopley, 1968, p. 194). The spatialization of these sirens is therefore a realization of their essentially "visual" natures. Conversely, the *concrète* samples are unambiguously symbolic, "irrational" sounds that are coded "primitive" and "feminine," like the ritual gong that opens the piece, the chanting near the end, and a female voice that is heard in various stages of moaning, wailing, crying, and ecstasy. Like the African goddess in the film, this female voice embodies the primordial essence of humanity. At one point she howls unintelligible phonemes. Later, she sings a sequence of unadorned vowels that develops into an impossibly primal scream. These human sounds are unintelligible; they are intended to be sensed, not structured. The *concrète* recordings in *Poème électronique* therefore occupy an "acoustic space," whereas the synthetic sounds in it operate within visual space.

As with the other media in the Philips Pavilion, *Poème électronique* told a "story of all humankind" by relying on such conceptual binaries as white/racialized and primitive/enlightened, categories that are framed within the larger dialectic between acoustic and visual space. In it, an "Oriental" gong is contrasted with a Christian choir, primitive woodblocks with electronic saws, fleeting birdsongs with foreboding industrial machinery. These sounds are not only contrasted for their strictly acoustic or formal qualities, but also for the relative positions that they occupy within an historical framework.[9] Sounds belonging to humankind's collective past are unintelligible and sensational, while sounds that point to its imagined future are rational. This is perhaps most apparent in the final moments of the music, which, like the ending of film, portray a transcendent and utopian vision of the future. While the music had so far proceeded at a relentless rate of contrasting forms, the final 35 seconds are reserved for the development of a single, "unified" sound, the musical equivalent to the film's rainbow-colored baby: a lone, rising electronic tone that moves upwards in frequency, amplitude, and space, a sonic metaphor for the transcendent human spirit.

The Philips Pavilion not only illustrated the tensions underlying McLuhan's and Carpenter's theories of acoustic and visual space, it also

9. In an early correspondence with Le Corbusier about his music for the Philips Pavilion, Varèse said he imagined "beautiful fragments of ancient liturgical music set against a background of modern music, disrupted by violent or impersonal bursts….of modern music" (Trieb, 1996, p. 170).

performed a conceptual transposition of these categories. In envisioning a multimedia *Gesamtkunstwerk*, Le Corbusier sought to visually create an *espace acoustique* in which the irrational and transcendent qualities of acoustic space were evoked through "acoustic" relationships between visual structures. Similarly, Varèse used visual tropes in order to rationalize acoustic space. He wrote:

> Pour mieux me faire comprendre, car l'œil est plus rapide et plus discipliné que l'oreille, transférons cette conception dans le domaine visuel et regardons la projection changeante d'une figure géométrique sur un plan, avec la figure et le plan qui tous deux se meuvent dans l'espace, mais chacun avec ses propres vitesses, changeantes et variées, de translation et de rotation. La forme instantanée de la projection est déterminée par l'orientation relative entre la figure et le plan à ce moment. Mais en permettant à la figure et au plan d'avoir leurs propres mouvements, on est capable de présenter avec la projection une image hautement complexe et apparemment imprévisible. (Varèse quoted in Ouellette, 1968, p.83.)

By mapping out sounds as planes and objects within a definite, three-dimensional Euclidean space Varèse effectively "visualized" acoustic space. He rendered what McLuhan and Carpenter had described as the chaotic and indefinite space of hearing *definite and linear*. This project to rationalize and visualize acoustic space aimed to place music on par with other forms of Western visual culture:

> We suppress or ignore much of the world as visually given in order to locate and identify *objects* in three dimensions. It is the objects which compel our attention and orient our behavior; space becomes merely that which must be traversed in getting to or from them. (Carpenter and McLuhan, 1960, p.67; *italics* in original.)

When the sonorous object materialized in the medium of magnetic tape, composers sought ways of systematizing the knowledge and perception of these objects. At the *Radiodiffusion Française*, sonorous objects were studied according to such "objective" values as mass, dynamics, timbre, melodic profile, and grain. Systematic procedures for studying the "typology" and "morphology" of sonorous objects were developed, and attempts were made to collect and classify them within vast libraries of found sounds (cf. Schaeffer, 1966). These projects to collect, classify and analyze sound objects reveal an underlying desire to territorialize sound objects, to locate their distinguishing qualities and "place" them in such a way that they might be objectively known.

The appearance of the sound object coupled with the Western bias towards objective knowledge led composers to seek for sound "an objectivity that is proper to it" (Schaeffer, 1966, p. 77). The spatialization of sound objects in

Poème électronique rendered this objectivity of sound and music absolute. In this wider cultural context, I hear Varèse's negotiation of acoustic and visual space in *Poème électronique* as both measuring the sensuality of sound and the subjectivity of hearing against the rationalization of sound objects, as well as operating within a larger language of control and territorialization in which objects are fixed, located and defined so that they might be known.

Conclusion

Postwar spatial music projects were critical in several regards. They reinvigorated the spatial imagination within the Western art music tradition, and articulated concepts of acoustic space that remain dominant within that tradition today. Specifically, these projects figured space as an empty container in which objects, planes, and masses of sound could be mapped out according to the axioms of Euclidean geometry, thereby transferring culturally-significant properties of visual space onto the acoustic imagination. With *Poème électronique*, Varèse conferred to a "primitive" and "primordial" acoustic space qualities that had been reserved for visual space: its linearity, its legibility, and its rationality. In rendering acoustic space "visual," the perception of sounds shifted from the sensual, emotional, and primordial realm of the (non-Western) acoustic imagination to the structured, logical and enlightened realm of the Western visual imagination. In this context, the ability to give music spatial form was not merely a matter of technological prowess. It was also a matter of willing, and enabling, music to function on strictly objective and rational terms, thereby conferring to music the status of "a way of knowing" as determined within traditions of Western philosophy. With *Poème électronique*, Western music entered the realm of Western visual culture.

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