

3.4.

Theories of spatialization in Darmstadt:Stockhausen and Boulez

The discussion of the "spatialization of time" in Chapter II (section 2.2) included references to the association of the spatiality of musical material with the distribution of such static sound matter in the space of performance (Stockhausen 1959/1961; Ligeti 1960/1965; Bayer 1987). This connection was pointed out by composers affiliated with the Darmstadt Courses for New Music who attributed the conquest of "physical" space to the "temporal" staticity of new music (Stockhausen, Boulez, Ligeti). As Stockhausen expressed it, music ventured into space, because musical ideas were "becoming increasingly spatial" (Stockhausen 1959/1961: 70).⁵²

The ideas of post-war avant-garde music are spatial in two ways: (1) in a geometric sense, because music is often conceived of as consisting of points, blocks, and shapes presented in a space of two or three dimensions (e.g. Webern's music interpreted by Ligeti and Eimert); (2) in a general, mathematical sense, because features of sound are separated into "musical parameters" and manipulated by spatial means (e.g. the use of vector space by Xenakis). Music composed of spatial sound matter which is characterized by a solidity of physical objects or a staticity of geometric figures is not designed to be expressive and does not leave much room for freedom of interpretation.⁵³

Two compositional theories of spatialization discussed in this section (Stockhausen and Boulez) exemplify the strengths and weaknesses of highly

⁵²Xenakis shared this view and considered the possibility of an expansion of his compositional technique into space: "We can, for example, imagine protocols of screens attached to a particular point in space. . ." (Xenakis 1971: 109).

⁵³Here, a similarity to Stravinsky's notion of "musical objects" is immediately apparent. In addition, the concept of the static spatialization of musical material may be seen as the summit of formalist aesthetics (cf. Hanslick 1854/1986) as well as the fulfilment of the idea of "absolute" music, deprived, however, of its spiritual dimension and limited to its purely structural aspects (cf. Dahlhaus 1978/1989; Goehr 1992).

speculative approaches to the subject of musical spatiality. For both composers, spatial location (or distribution) is yet another "parameter" of musical sound.⁵⁴ They focus on isolated features of sound material, giving no attention to the experiential, expressive or symbolic functions of spatialization.

Karlheinz Stockhausen

While studying in Paris (in 1951-1952) Stockhausen had ample occasion to witness the very earliest experiments with three-dimensional movement of sound at the *musique concrète* concerts (cf. section 3.3). Soon afterwards, he composed his first spatialized pieces: for orchestra (*Gruppen für Drei Orchester*, 1955-1957), and for electroacoustic sound projection (*Gesang der Jünglinge* for five loudspeakers, 1956).⁵⁵

Stockhausen presented his notion of spatialization which he developed on the basis of these experiences in an influential article, "Music in space," written after the premiere of *Gruppen* in 1958.⁵⁶ In this text, as a true "avant-gardist," Stockhausen dismisses earlier examples of "spatial" music as irrelevant to the future of compositional technique. Thus, he considers Gabrieli's polychorality as a mere expansion of the principle of dialogue into space, and he criticizes Mozart's Serenades for their exclusive use of the baroque echo principle, and Berlioz's dramatic use of spatial effects as too theatrical to be relevant to the "structural" concerns of contemporary music.⁵⁷ According to Stockhausen, these three "antiquated" ways of making music spatial must be replaced by a new spatiality associated with

⁵⁴Leigh Landy writes about "the 'parameter' space" in a separate chapter of his status report about the state of experimental music in the 1980s (Landy 1991: 105-116).

⁵⁵The latter work was recorded on two tapes, one with four channels and an additional one with the remaining, fifth channel. The number of channels indicates that the loudspeakers worked as independent point sources not as stereo pairs.

⁵⁶This article was prepared as a lecture for Darmstadt (Stockhausen 1959/1961).

⁵⁷ Mozart's *Serenata notturna* K. 239 and *Nocturne* K. 286. Stockhausen does not mention Mahler, Ives, Varèse, nor Brant.

serialization.⁵⁸

Stockhausen's argument for the necessity of spatialization links it with a need to clarify the constantly varying surface of serialized music, which can evolve so rapidly that it gives the impression of not changing at all:

The music finally becomes static: it changes extremely quickly, one is constantly traversing the entire realm of experience in a very short time, and thus one finds oneself in a state of suspended animation, the music 'stands still'.

(Stockhausen 1959/1961: 69)

The "standstill" of the music results from the equalization of all the parameters of sound: if one sound characteristic predominated, it would act to articulate the music but, simultaneously, would destroy the work's balanced structure. Therefore, in order to make the music more interesting for the listeners, various long time-phases of homogeneous sound structures may be distributed in space, among different groups of loudspeakers or instruments. Thus, spatialization heals the dissolution of polyphony into monody (a characteristic of serialized music); it is "possible to articulate longer pointillistic structures by having them wander in space, by moving them from one place to another" (Stockhausen 1959/1961: 70). With a separation in space, "one easily perceives two layers of one and the same sound pattern" (*ibidem*).

This statement resembles Brant's main argument in favour of the use of space in music: spatial separation clarifies musical texture, especially if this texture consists of many layers confined to the same register (Brant 1955; cf. section 3.2 of this chapter). However, unlike Brant, Stockhausen is (at that time) primarily preoccupied with isolated "musical parameters." Thus, he presents a general hierarchy of tone-characteristics in Western art music, ranked from the most important down (p. 72):

1. pitch (harmony-melody)
2. duration (metre-rhythm)

⁵⁸According to Henry Brant, Stockhausen used Brant's article of 1955 while composing *Gruppen* (Brant 1992: 14). In order to substantiate his claim, Brant cites a biography of Boulez which contains "eye-witness" accounts by people who saw Brant's article on Stockhausen's desk in the mid-1950s (Peyser 1976).

3. timbre (phonetics)
4. loudness (dynamics)
5. location (topography)

Stockhausen rejects distance as a possible "musical parameter," on the grounds that the perception of distance is a combined impression of changes in the intensity and timbre of the sound in open space, depending, in addition, on the proportion of direct to reverberated sound in enclosures. As he rightly observes, loudness is a spatial characteristic of sound (the greater the distance the weaker the sound).⁵⁹ Moreover, the perception of the "near--far" dimension is based on the change in the spectral content of the sound (including temporally defined characteristics, such as transients). As the serialist's objective is to apply the same means of structuring to all the different features of sound, these characteristics should be clearly isolated from each other and manipulated separately. Therefore, according to Stockhausen, distance cannot be a compositional parameter: it lacks independence from the remaining characteristics of sound. Instead, the composer postulates the adoption of spatial direction, easily serialized, as the new parameter in music.

The composer considers several variants of linking the organization of other, isolated parameters to spatial position, beginning with a one-dimensional arrangement of sound sources. If, for example, 48 musicians are placed on a straight line, in front of the listeners, from left to right, and if each musician performs one chromatic pitch from the four-octave compass (48 pitches), it is possible to create a kind of "*space--melody*" which evolves in pitch and in space simultaneously.⁶⁰ Therefore, one can "relate proportions of pitch, duration, timbre and loudness with those of tone-locality" (p. 79). However, more interesting effects may be created when the performers are

⁵⁹The perception of distance depends also on other cues (cf. Chapter IV).

⁶⁰This effect enables the audience to experience aural images similar to those heard by musicians performing on large keyboard instruments, such as the piano and the organ: music is physically extended in space in front of the listeners.

placed on a circle surrounding the listeners. Here, spatial direction differs from the remaining features of sound in that it is circular. According to Stockhausen, "all parameters mentioned so far are one-dimensional: pitches between low and high, durations between long and short, timbres between dark and bright, loudness between soft and loud." (Stockhausen 1959/1961: 79).

By establishing exact proportions, analogous to durational ratios, between various positions on the circle it is possible to create "the scale of localities corresponding to the scales of pitch, duration, timbre and loudness" (p. 82; cf. Ex. III-7). Stockhausen thinks that it would be necessary, however, to ascertain by experiments the smallest unit that can be perceived and used as an element in the scale of spatial locations. He concludes that it is also possible to use continuous sound motion along the circumference of the circle. He had already demonstrated this possibility in *Gesang der Jünglinge*, his first musical attempt to make "the direction and movement of sound in space" accessible as a "new dimension for musical experience" (p. 68).

Stockhausen's image of a circle, evenly subdivided into equal segments, represents a scale of directions which, while theoretically possible, is, in reality, perceptual nonsense. The acuity of the perception of sound direction differs depending on the orientation of the listener; human beings distinguish sounds from the front, side, and back with different degree of exactness (Blauert 1983: 37-50). Moreover, the so-called "localization blur" depends on the familiarity of the sound and on its detailed characteristics, including pitch and spectrum. Therefore, Stockhausen's metric scale of directions (measured as intervals on the circle or as angles) is a theoretical construct without a perceptual basis. However, this idea is inherent in total-serialist thinking: all aspects or parameters of sound should be treated equally and all should be readily available for manipulation.

The composer attempted to serialize direction in this manner in *Gesang der Jünglinge*; in the orchestral *Gruppen für Drei Orchester* (1955-57), though, he used spatial separation mostly to clarify dense and complex textures. This work, one of the most influential compositions in the history of spatialized music, calls for a massive

force of 109 musicians.⁶¹ These are split into 3 orchestras (each with its own conductor) arranged in a horseshoe position on platforms semi-surrounding the audience in a large hall (cf. Ex. III-8). In Stockhausen's words:

The similarity of the scoring of the three orchestras resulted from the requirement that sound-groups should be made to wander in space from one sounding body to another and at the same time split up similar sound-structures: each orchestra was supposed to call to the others and to give answer or echo.

(Stockhausen 1959/1961: 70)

For the composer, it is important "to be able to experience the simultaneity of various time-spaces and movements" in this work (Stockhausen 1959/1961: 71). An instance of sound movement is presented at group 119 in the score with the rotation of three successive hexachords in the brass. The illusion of movement is constructed by the temporal overlapping and dynamic shaping of the sounds (Ex. III-9). The chords swell dynamically in the third, the second, and finally in the first orchestral group, creating an impression of the continuation of the sound essential for the perception of its movement. The simulation of motion through stationary sources is not entirely successful: there are too few instrumental groups which are too distant in space and which play chords with the dynamic peaks too widely spaced in time. This, and the fact that brass timbres are quite difficult to match exactly, hampers the perception of a single auditory stream, that is, the image of one rotating sound.⁶² The perception of movement requires the establishment of the identity of a moving object (brass hexachord), and the existence of a time-space that this object travels through. Obviously, changes in the pitch domain are unwarranted--they would destroy the identity of the rotating "musical object." Nonetheless, moments of sound movement in *Gruppen* are quite rare (they are limited to interludes). The predominant, dense texture of this work results from a simultaneous performance of the three orchestras.

⁶¹Among composers who admit being influenced by *Gruppen* are Andrzej Dobrowolski, Kazimierz Serocki, Elliott Carter and Marco Stroppa.

⁶²The term "auditory stream" is taken from Bregman (1990).

"Music in space," written predominantly in the future tense, contains, in addition to the speculative theory of spatialization and the discussions of Stockhausen's compositions, a proposal for a new, ideal concert hall:

My idea would be to have a spherical chamber, fitted all round with loudspeakers. In the middle of this spherical chamber, a platform, transparent to both light and sound would be hung for the listeners. They could hear music, composed for such adapted halls coming from above, from below and from all directions.

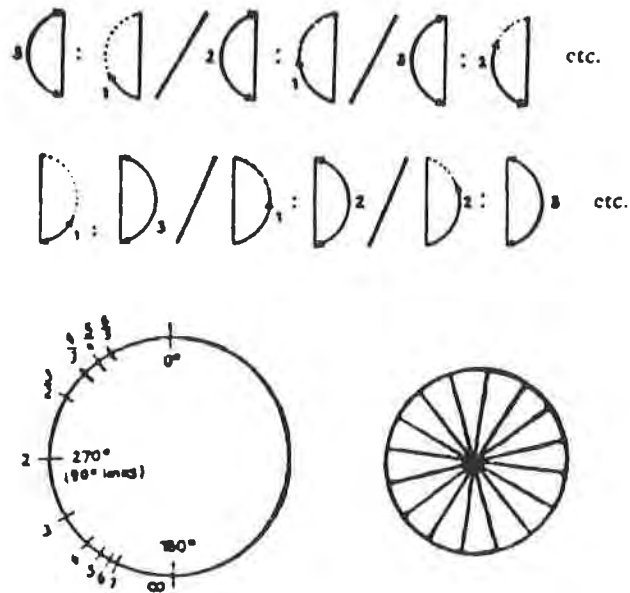
(Stockhausen 1959/1961: 69)

The spherical pavilion would be a musical equivalent to an art gallery, featuring continuous programmes of electronic music, that one could hear "at any time of day" (p. 69).⁶³ This idea was realized in the German Pavilion at EXPO 1970, in Osaka (Ex. III-10). The Pavilion housed Stockhausen's own compositions exclusively, including *Spiral* for solo performer (the source of description of this set-up; Stockhausen 1973). A special multi-channel system for sound rotation in space was designed, allowing for circular (on a plane) and spiral (ascending to the top of the construction) motions of sound. The rotations of sound were controlled manually in a live performance by means of two "soundmills" with moving joysticks (Stockhausen 1971/1989: 103).⁶⁴ This idea of transforming the spatial gesture of a performer into a trajectory of sound movement resembles the principle of "kinematic relief" in *musique concrète* (Poullin and Schaeffer, cf. section 3.3).⁶⁵

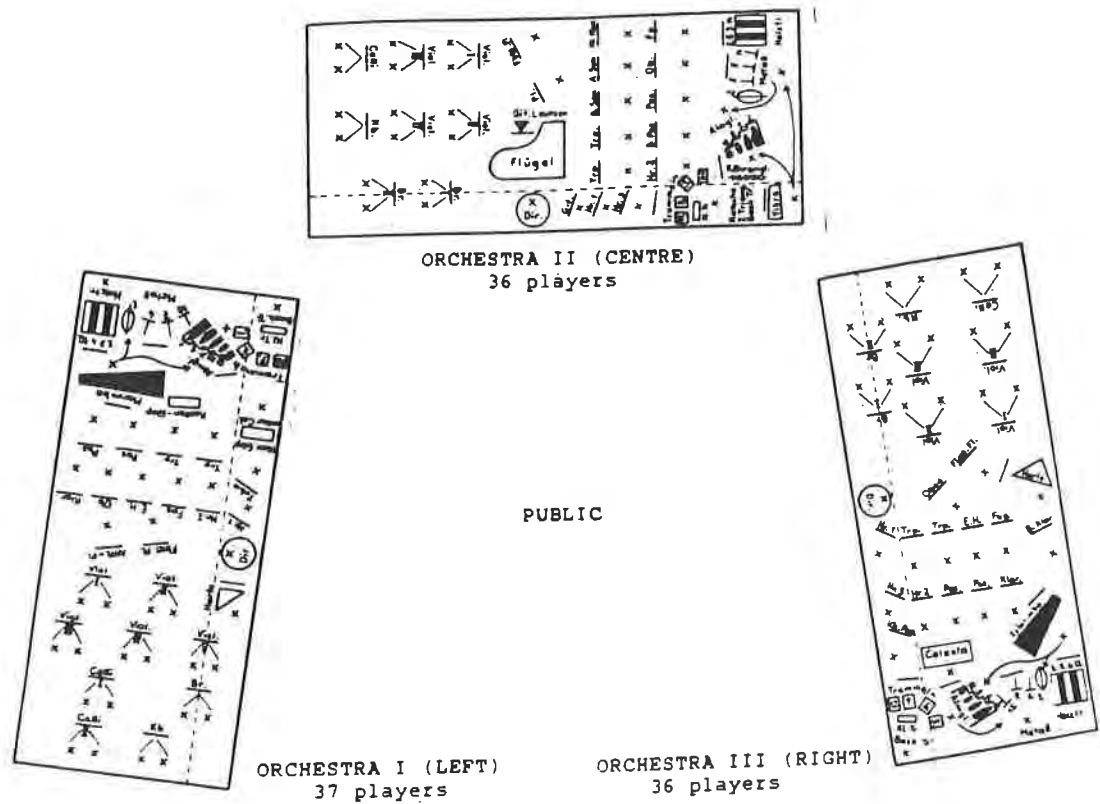
⁶³Recall Franz Liszt's vision of a museum of musical masterpieces, in which performances of the greatest compositions are scheduled daily (cf. Liszt's "On the position of artists and their place in society" of 1835, quoted by Walker, 1987: 160).

⁶⁴As Stockhausen said in a lecture of 1971 ("Four criteria of electronic music"), the two soundmills connected one input with ten outputs each and allowed a speed of rotations up to 5 revolutions per second. Three trajectories could be explored at once, and the music could be either improvised or predetermined. Thus, "a free spatial composition" was possible (Stockhausen 1971/1989: 103-105).

⁶⁵Stockhausen's vision of a new, versatile performance space was not an absolute novelty. The spherical concert hall had a predecessor in the form of a spherical theatre, proposed in 1924, but never realized, by Andreas Weininger, who wanted to have the audience seated at the internal side of the sphere (Braun 1982: 221). The platforms,



Ex. III-7: Spatial intervals and scale of directions on the circle in Stockhausen's "Musik in space" (1959/1961: 82).



Ex. III-8: Placement of the 3 orchestras in Stockhausen's *Gruppen für Drei Orchester*.

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119 $\text{♩} = 120$

Hörner sffz

1. ff

2. ff

Trumpeten

Posaunen sffz

Kleine Trommel mit Saiten sffz

pp ff ppp

Dämpfer ab

119 $\text{♩} = 120$

Hörner 1. ppp ff ppp sffz

3. ppp ff ppp sffz

1. ff

2. ff

Trumpeten

Posaunen sffz

Kleine Trommel mit Saiten sffz

Klavier sffz (Akkoord klingt leise weiter) - - - \rightarrow

ca. 1/2 Ad. bis 120

119 $\text{♩} = 120$

Hörner 1.3 ppp ff pp ff

1. ff

2. ff

Trumpeten

Posaunen 1.2 sffz

Ex. III-9: Illusion of sound movement in Stockhausen's *Gruppen*, group 119.

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Carré (1959-1960), *Kontakte* (1960) and many other instrumental and electroacoustic compositions by Stockhausen reveal his continuous preoccupation with sound movement (Harvey 1974: 88). Nonetheless, his awareness of musical spatiality has been transformed by years of practical experience, especially with electroacoustics. In a lecture of 1971, the composer considered "the multi-layered spatial composition" as one of the "four criteria for electronic music." The composer explained:

Multi-layered spatial composition means the following: that not only does the sound move around the listener at a constant distance, but it can also move as far away as we can imagine, and also come extremely close. These characteristics are distinctly different. . . Building spatial depth by superimposition of layers enables us to compose perspectives in sound from close up to far away, analogous to the way we compose layers of melody and harmony in the two-dimensional plane of traditional music.

(Stockhausen 1971/1989: 105-106)

This statement contradicts the earlier theory (put forward in "Music in space") in which distance is superseded by direction, the only "parameter" of sound localization allowing for its serialized treatment. With a growing awareness of the qualities of the virtual sound space in electroacoustic music, Stockhausen's interest in the serialization of direction recedes, as it were, into an infinite distance. Finally, spatialization means a polyphony of musical layers presented simultaneously or structured in time; the music, no longer serialized, ceases to be static.⁶⁶ Thus, the evolution of Stockhausen's conception of musical spatiality has led towards the "mainstream" type of spatialization: the co-existence of distinct layers (Ives and Brant; cf. Section 3.2).

balconies, gangways would create a multi-level three-dimensional theatrical space filling the inside of this sphere. The difference between the two spherical spaces (listeners surrounded by music and spectators around theatrical actions) reflects the distinction between auditory and visual perception, the auditory being omnidirectional, the visual limited to the frontal area.

⁶⁶However, Stockhausen's vision of the interpenetration of sonorities presented at various planes, at different distances from the listener, bears a resemblance to Varèse's notion of "zones of intensities" (cf. above, section 3.3).

Pierre Boulez

Boulez's formative experiences in the domain of spatialization resemble those of Stockhausen. As a student, he had participated in the early experiments of *musique concrète* in Paris (1951-52).⁶⁷ Later, he prepared the premiere of *Gruppen* in 1958 (as one of the three conductors, with Stockhausen and Maderna). Finally, he was actively involved in the foundation of the Darmstadt Courses. These activities of the composer, conductor, thinker and lecturer shaped Boulez's awareness of musical spatiality which he expressed in a series of essays "written in Darmstadt for Darmstadt" and published under a German title, *Musikdenken heute* (Boulez 1963/1971).⁶⁸

In a text from this collection, "Musical Technique," Boulez discusses the ramifications of serialism, and general compositional resources available at the time, including spatialization and "musical space."⁶⁹ Similarly to Stockhausen, Boulez considers different "parameters" of sound in isolation (pitch, durations, timbre, dynamics, and spatial characteristics).⁷⁰

Space, however, is not "an intrinsic function of the sound phenomenon, but rather its index of distribution" (Boulez 1963/1971: 66). Boulez deplores the apparent mistakes committed in the use of space in the past (in the vein of Stockhausen), maintaining that spatialization "was almost always reduced to altogether anecdotal or

⁶⁷For a recent discussion of the composer's early interest in spatialization and the role of space in Boulez's music see Boulez and Nattiez (1991).

⁶⁸This book is also known under its French title, *Penser la musique aujourd'hui* (Paris: Gonthier, 1963); English translation, entitled *Boulez on Music Today* appeared in 1971. Here, I will refer to this translation.

⁶⁹Boulez's concept of "musical space" is discussed in Chapter II, section 2.3.

⁷⁰In the overall schema of "musical syntax" (p. 115) spatial distribution constitutes the final element. The schema includes: pitch (absolute pitch and relative tessitura), time (durations/proportions, tessituras and tempo), dynamics (absolute dynamics, i.e. ratios; relative dynamics, i.e. values; dynamic profiles), timbres, and spatial distributions (Boulez 1963/1971: 115). The universal concepts of fixity and mobility can be applied in all these areas.

decorative proportions, which have largely falsified its use and distorted its true functions." He dislikes the superficial use of spatial effects, both in the distant past (Berlioz and the Venetians) and in more recent times (the mannerism of clockwise or anticlockwise motion, and the abuse of *space-glissandi*, linked to an "immoderation" in the use of clusters).⁷¹ For Boulez, *spatial distribution* merits a sophisticated compositional treatment, "just as refined as the other sorts of distribution already encountered" (p. 67):

It ought not only to distribute spaced-out ensembles according to simple geometric figures, which after all always turn out to be contained in a circle or an ellipse: equally--and in fact even more so--it must order the microstructure of these ensembles. While speed of displacement has always been stressed above all, little attention, amounting almost to total neglect, has been paid to the properties of statistically distributed objects linked in a circuit, or of mobile objects.

(Boulez 1963/1971: 67)

Spatial distribution is primarily related to temporal simultaneity and succession, but relationships to pitch, dynamics and timbre are also possible. For Boulez, spatialization involves the articulation of textural details in complex sonorities: "the real interest in distribution lies in the creation of 'Brownian movements' within a mass, or volume of sound" (p. 67). Moreover, the position of the listeners "outside or inside the area within which the sound events occur" is crucial for their involvement in the music; either they observe the sound from outside, or they are "observed by the sound, surrounded by it" (p. 68).

Boulez distinguishes two types of distribution of structures: *static distribution* and *mobile distribution*, also called *static relief* and *dynamic relief*" (p. 68). This distinction and terminology closely resembles that of *musique concrète* (Poullin 1955; cf section 3.3). The composer proposes that mobile distribution should be realized by *conjunct and disjunct movements* which are not dependent on distance, but on the

⁷¹According to Luciano Berio, Boulez called these "space-glissandi," that is the rotational movement of sound "car racing" (Berio 1981/1985: 154). Berio himself also expressed a lack of interest in these easy tricks of "moving the sound round and round the hall" (ibidem).

temporal overlapping of sounds with common features in the domain of pitch, timbre, dynamics and duration). Boulez explains this theory with an example. If two chords are performed, and if

the first chord is played at a given point in space, the second at some distance from this point; if the first is still sounding at the moment of entry of the second, and dies away to reveal it the result is what I call a *conjunct interval*.
(Boulez 1963/1971: 68)

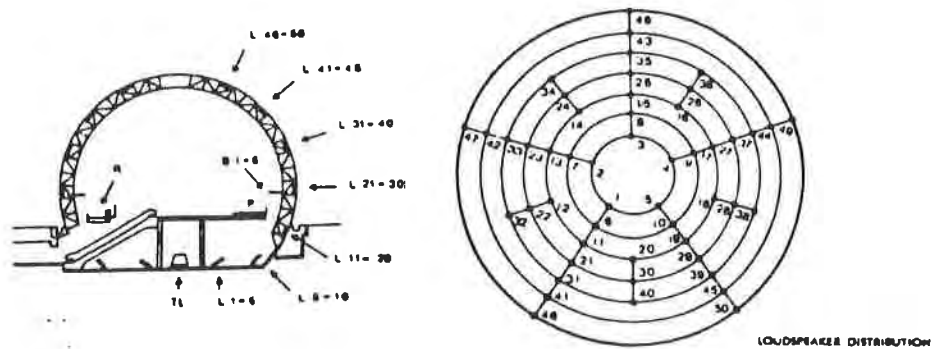
Disjunct interval occurs when a pause separates the two chords; this pause should be sufficiently short to allow for the impression of the displacement--if the pause is too long the perception will be of two distinct events (cf. Ex. III-11).

By using the two types of spatial intervals, it is possible to create "continuous displacements of lines or discontinuous leaps between points" at various levels of structure (p. 69). Nevertheless, Boulez has reservations about such mobility of musical gestures, because movement brings out theatrical aspects of performance, with negative consequences for the music. Therefore, he prefers a *fixed spatial lay-out* in which the conjunct and disjunct intervals are fixed. This type of distribution "represents in the arrested state what a spatial lay-out offers kinematically" (p. 69). The intervals observe the "elementary laws of regular or irregular symmetry, of asymmetry, and of the combination of these two forms." Here, Boulez takes into consideration all possible combinations of groups of instruments in space. As he explains,

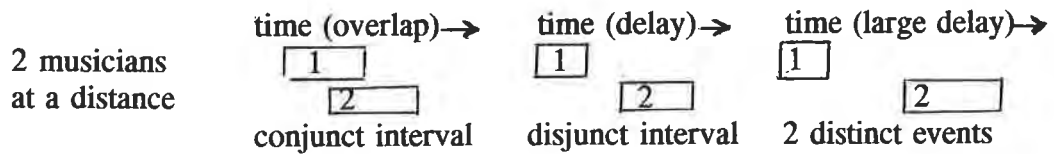
two groups will be symmetrical if they are situated at an equal distance from an axis of some kind; if they possess homogeneous or non-homogeneous timbres, identical in quality and density, they can be considered as *regularly symmetrical*; they are *irregularly symmetrical* if their homogeneity is not of the same nature (a group of brass against a group of strings, for example) or if their non-homogeneity differs in quality and density; they will otherwise be *asymmetrical*.

(Boulez 1963/1971: 70)

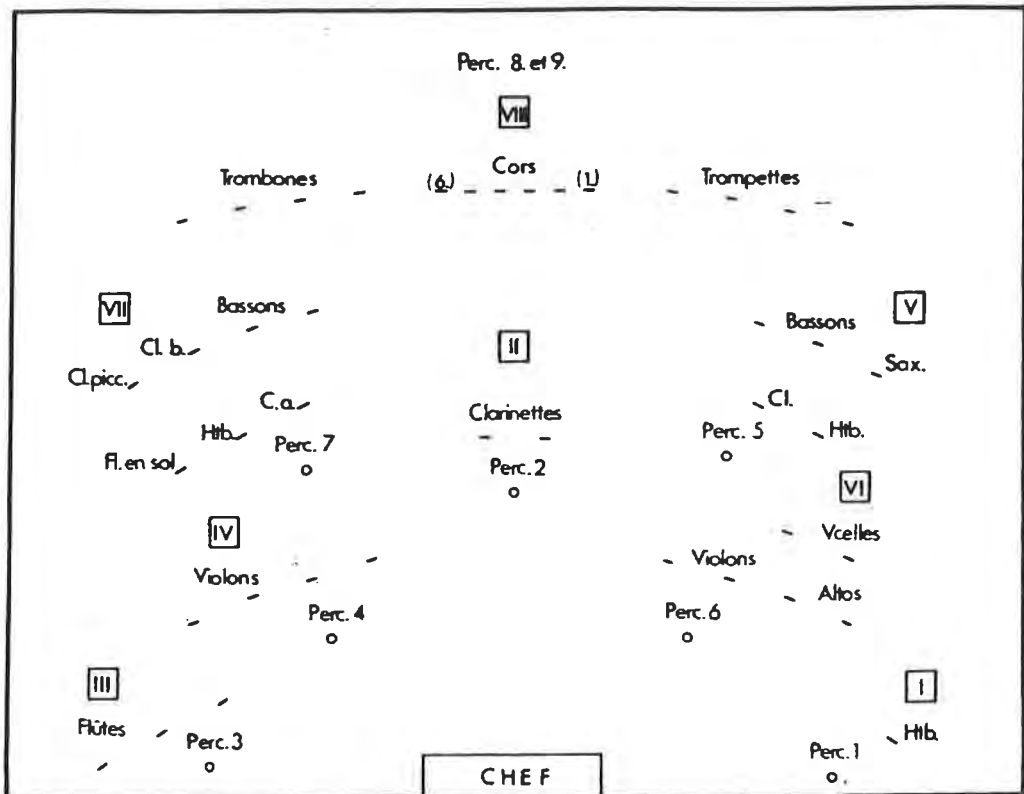
Here, the typology of spatial relationships between instrumental groups includes timbre as an important criterion for symmetry. The remainder of the article is devoted to other matters; nonetheless, the composer returns to the idea of



Ex. III-10: Plans for the German Pavilion at EXPO 1970 Osaka (from Stockhausen's *Spiral* 1973).



Ex. III-11: Disjunct and conjunct intervals described by Boulez in *Musikdenken heute* (1963).



Ex. III-12: The seating plan for Boulez's *Rituel in memoriam Maderna* (1975).

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spatialization, that is "the distribution of structures" in order to consider the choice of compositional procedures applicable in this domain (p.96). He proposes to utilize the same type of structuring that he had introduced for timbre (selection of modules, partitions, focus, etc.).⁷²

Boulez's approach to the idea of spatialization is more general than Stockhausen's; however, he shares the German composer's penchant for speculation. For instance, his differentiation between conjunct and disjunct intervals, as well as his discussion of the various types of symmetry and asymmetry, are not supported with any experimental data.

Nevertheless, Boulez realizes his spatial concerns in the music. As he does not share Stockhausen's preoccupation with motion (cf. his explicit contempt for "the abuse of *space-glissandi*" quoted above), he explores other, more subtle spatial effects. Thus, he focuses on enriching the spatial texture of the music by changing the location of the instrumentalists within the orchestra on the stage. In *Figures, Doubles, Prismes*, the orchestra is divided into 14 groups (six groups of strings, three of woodwinds, four of brass, and one of unpitched percussion) which are all placed on the platform, with several pitched percussion instruments interspersed among them (3 harps, celesta, vibraphone, xylophone, timpani).⁷³ This novel stage set-up of the orchestra has the purpose of transforming its sonorities, from separate sound blocks of different timbres (string, woodwind, brass, percussion) into more homogeneous textures woven from these various timbres. As Boulez stated in conversation with

⁷²"The module will be the conjunction of a periodic distance with the periodicity of the elements or groups of elements, inscribed within it. Partition will be the division of this distance corresponding to an element or group of elements of the period, the focus will be defined as a point or surface, coupled with a specific family of phenomena." (Boulez 1963/1971: 96-97). These terms (module, partition, focus) are originally introduced in Boulez's enumeration of possible abstract spaces, applicable primarily to pitch and rhythm (cf. Chapter II, section 2.3).

⁷³The first version of this piece was titled *Doubles* (1957). It was extended into the larger work, *Figures, Doubles, Prismes* in 1963 and revised in 1968. There is no score available for study, only recordings and the manuscript material deposited at the Paul Sacher Foundation in Basel (Edwards 1989: 6-7).

Celestin Deliège, in the traditional setting contrasting timbral groups are located at a "series of screens, as it were, or of different planes;" this arrangement is "fairly logical in that it corresponds to the instruments' volume" (Boulez 1975/1976: 100). However, by splitting the homogeneous ensembles, by scattering woodwinds, etc., the orchestra acquires a new, spatial quality. Boulez believes that "when you hear the work live, the sonorities are extremely homogeneous yet at the same time scattered, so that it is not a homogeneity of neighbouring groups but a homogeneity of fusion." (Boulez 1975/1976: 100).

In two instrumental compositions with spatial organization of sound, *Domaines* for clarinet and six instrumental groups (1961-1968) and *Rituel in memoriam Maderna* for eight orchestral groups (1974-1975) Boulez's interest in symmetry comes to the fore. In *Domaines*, the groups consist of from one to six instruments, mostly of different timbres.⁷⁴ These groups are presented individually, as they, one by one, respond to the solo clarinet; each exchange has a different musical material. After a series of such dialogues initiated by the soloist, another one follows in which the randomly chosen ensembles are "mirrored" by the clarinet. This piece, demonstrating Boulez's ideal of "the permutability of sequences within a predetermined whole" (Jameux 1984/1991: 147) suffers from the predictability of its large-scale, sectional structure. When one group is involved in an interplay with the soloist who has approached its spatial location, others remain silent. Boulez himself has been critical of the symmetry of this piece as being "too audible" (Boulez 1975/1976: 88).

While *Domaines* is organized around the number six (with six groups, six segments of musical material within each one of the six "cahiers") *Rituel in memoriam Maderna* features eight groups of homogeneous timbres, all placed on the stage (1 oboe, 2 clarinets, 3 flutes, 4 violins, woodwind quintet, string sextet, woodwind heptet, and fourteen brass instruments). Each group is accompanied by a percussion

⁷⁴The groups are: one bass clarinet, a duet of marimbaphone and double bass, a trio of oboe, horn guitar, four trombones, a quintet of flute, saxophone, bassoon, trumpet, harp, and a string sextet (Boulez 1970).

player (two for the brass) beating out the rhythm on a variety of unpitched instruments. This work is--as is *Domaines*--structured in "perpetual alternation" (Boulez 1975). However, the pattern is more complicated and consists of a sequence of 15 sections: even-numbered verses (non-synchronous heterophonies) and odd-numbered refrains (immense chords of all groups together, starting from the brass group with gongs).⁷⁵ The large scale form is articulated by the change of the number of the groups, first increasing from one (sections 1 and 2) to all eight (sections 13 and 15), then decreasing to two. Here the symmetry of the spatial location of the instruments on the stage may have a role to play (Ex. III-12).⁷⁶

In the opening of the piece, the order of the entries seems to be spatially balanced. Group VIII (brass, Centre-Back) is followed by group I (oboe, Front-Right), and their conjunction (sections 1-3). Then, three groups play in heterophony (section 4): oboe (Front-Right), clarinets (Centre-Back), and flutes (Front-Left). The entry of the flutes from the left side of the platform creates a spatial balance in the music, which was earlier predominantly heard from the opposite direction. In addition, the three groups in section 4 outline a triangle on the stage (Left Front--Centre Back--Right Front). However, Boulez does not corroborate the importance of such geometrical symmetry in the spatial interactions of the groups in *Rituel* (Boulez 1992).⁷⁷ According to Boulez, the location of the instrumental groups on the stage is determined by their acoustical characteristics as they are placed progressively "from

⁷⁵The coherence of pitch organization stems from Boulez's use of one set of seven pitches, introduced in section II of *Rituel*. This set recurs in every verse; the refrains are based on its inversion.

⁷⁶In the interview with Jean-Jacques Nattiez, Boulez points out the connection between the concept of *Rituel* and his discovery of the potential of spatialization realized with the "halaphon." This signal processing unit, constructed by Hans-Peter Haller, allows for a flexible movement of sound between several loudspeakers (Haller 1972: 43; Boulez and Nattiez 1991: 116). Boulez used it in a New York performance of *Explosante-fixe* in 1973 (Vande Gorne 1988: 13).

⁷⁷Boulez's spatial preoccupations in the 1990s are far removed from the concerns of *Musikdenken heute*.

the biggest and strongest at the back of the stage to the smallest ones at the front" (Boulez 1992: 5). Moreover, the placement of all groups on the stage is a compromise with practical considerations; Boulez would much prefer to "put the groups very far from each other." This would allow the listeners to hear the separated groups very clearly, with a lucid articulation of details. Each member of the audience would listen to the work from a different perspective. In this respect, adds the composer, a far-away view, made possible by the location of all the groups on the stage in front of the listeners, also has merits because it allows one to perceive the "work in its totality" (ibidem). In the first version of the published score of *Rituel* (1975), the entries of groups in the refrains are simultaneous. Boulez's recordings, however, reveal that he preferred to stagger these entries in time (Jameux 1984/1991: 356-357).⁷⁸ As he explained in an interview, the unison performance does not create the impression of space:

If there are echoes played very quickly by groups entering each time in different order, and resounding from different points on the stage, the space is "described" each time with a new pattern of these echoes. This is much more interesting than having everybody play together.

(Boulez 1992: 5)

Thus, spatialization transforms the static texture of immense orchestral chords into a lively pattern of responses. This change involves structuring in time (from complete simultaneity to partial succession) and serves to enrich the perceptual experience of the music which acquires, through spatialization, a new vividness and clarity. According to Boulez, the main function of space in music is,

to clarify the situation, generally, the situation of polyphony. For me, it is not spectacular at all, I do not like spectacular effects. If I write polyphony which is not only dense or complex (that is not necessarily the case) but consists of different layers and different components which have to be separated by the ear, the distance certainly clarifies the situation and helps the listener to understand the various components much better.

(Boulez 1992: 1)

⁷⁸The revised version of the score explicitly indicates the delayed entries of the various groups.

However, the composer makes it clear that such topographical space is not the "substance" of the music. For Boulez, music is organized hierarchically with pitch or duration as the strongest elements (he reiterates the order used in the classification of musical parameters in "Musical Technique" of 1963). These elements, however, are not the most apparent in perception. The characteristics perceived immediately are tone colour and dynamics:

That is a kind of immediate perception while pitch and duration, while more decisive, are much more difficult to perceive. Space, topography is like instrumentation: it clarifies something else. For instance, one can play a polyphonic piece on the piano without timbral contrasts and polyphony will be there, but this polyphony will be much more distinct if different groups will play different parts. Space works exactly the same way.

(Boulez 1992: 2)

Here, Boulez considers spatialization in the context of polyphony, just as Mahler and Brant did.⁷⁹ Speculations about "conjunct and disjunct intervals" no longer interest him. However, he continues to link spatialization with orchestration, and spatial location with timbre; these are the "non-essential," though perceptually most vivid, elements of the musical language.

Boulez's "last word" on spatialization is not expressed explicitly in his writings but in his music. Through the years, his preoccupation has shifted from codifying elements of musical language towards exploring the territory that had been discovered (and, sometimes, well known in the past). He features spatialization prominently in *Répons* for six instrumental soloists, instrumental ensemble, and electroacoustic equipment (1981-1988), a piece that Boulez continued to revise and refine throughout the 1980s. This work, based on the ancient principle of antiphonal dialogue, draws the soloists, the ensemble and the electroacoustic sound projection into an immense,

⁷⁹One of Brant's experiments dealt with a spatialized performance of a polyphonic composition by J. S. Bach in which each part was played from a different point in space. Here, spatial separation was detrimental to the music consisting of different lines tightly knit to form a coherent whole (Brant 1967). The perceptual differentiation of the voices in the fugue does not benefit from spatialization because it is already provided by register (and, sometimes, timbre).

musical "conversation."⁸⁰ Here, Boulez returns to the mainstream of spatialization, to music consisting of "superimposed layers which do not coincide exactly" and, therefore, create a fascinating, vivid, spatial texture (Boulez 1992).

The choice of Stockhausen and Boulez as the two most prominent and vocal representants of "Darmstadt" does not imply the absence of spatial concerns among other participants in the international avant-garde. Luciano Berio, for instance, who also belongs to the Darmstadt generation, had actually experimented with spatialization in orchestral music earlier than Boulez or Stockhausen (but not earlier than Brant). In 1955, in *Allelujah I*, he "placed five different instrumental groups on the podium" but later decided that they could not be heard separately (Berio 1981/1985: 154). He revised the piece into *Allelujah II* (1957-1958) in which he specified the location of the groups at different points in the hall. Here, Berio followed the principle of perceptual separation (advocated by Brant), linking space and timbre: "groups containing similar instruments were placed as far apart as possible, while those with different instruments were seated closer to each other" (Berio 1981/1985: 155). This was, for Berio, hardly a general rule. According to the composer, the use of space differed in each of his compositions (p. 154). For instance, in *Coro* for 40 voices and instruments (1975-76), Berio adopted Boulez's solution from *Figures, Doubles, Prismes* and subdivided the whole performing apparatus into small ensembles distributed on the stage. Similarly to Boulez, Berio tried to replace the homogeneity of large scale textures of separated groups (chorus and orchestra) with a microscopic textural differentiation. However, in *Coro*, "the role of space is determined by the relationship between the registers of the human voice and the instruments" (Berio 1981/1985: 154). High voices are coupled with high instruments, thus creating "a soprano territory, an alto territory, and so on" (p. 155). Therefore, spatial

⁸⁰I discuss *Répons* in Chapter V, section 5.5.

distribution is connected to pitch.⁸¹

The thrust of the Darmstadt generation ensured the inclusion of spatialization as an obligatory feature of "modern" music written by composers in many countries. However, in the process of discovery and exploration, the initial fascination with structuring individual, separated "parameters" including the spatial position of sound, was gradually replaced by a concern for perceptual clarity. In other words, the emphasis shifted from considering compositional material in abstraction to "constructing" the experience of the listener in the concert hall. Spatialized compositions, while remaining "musical works" in the common sense of this term (cf. Chapter IV), have enriched the physical actuality of music through the greater involvement of the listeners, often completely surrounded by sounds, through the articulation of distinct sonorous layers and through the spatial articulation of large-scale forms.

⁸¹Recall that Stockhausen considered a case of musicians located along the line and performing a spatial scale of pitches in "Music in space" (Stockhausen 1959/1961: 79; cf. above).

3.5.

Conceptual experimentation: Cage, Lucier and Schafer

The shift in emphasis from abstract musical materials to perceptual experiences which is apparent in the evolution of the views on space of the members of the Darmstadt avant-garde, brings their ideas close to the preoccupations of the musical experimentalists.⁸² Artists-philosophers, such as John Cage, sought to broaden the definition of music, restructure musical experience, and challenge the basic assumptions of the musicians and the listeners. Here, a cursory description of Cage's views on space and spatialization is followed by a review of some of Alvin Lucier's acoustic-perceptual experiments which exemplify the expansion of compositional interests into the domain of installations, site-specific music, etc. Finally, the discussion turns towards the experimental musical theatre of R. Murray Schafer, who, inspired by Ives, Cage and the theatrical experiments at Bauhaus, envisions a form of art that would change the spectators' self-awareness and, perhaps, their existential status.

John Cage

In 1939, John Cage advocated "making music with its materials, sound and rhythm, disregarding the cumbersome, top-heavy structure of musical prohibitions" (Cage 1939/1961: 87). This meant, primarily, a rejection of pitch organization as the basis for compositional thinking.⁸³ Music based on "sound and silence" may include any sounds conceivable "within a rhythmic structure that includes silence" (Cage

⁸²I borrow the distinction between "avant-garde" and "experimental" music from Michael Nyman's *Experimental Music: Cage and beyond* (Nyman 1973).

⁸³Cage reiterated this view in 1949: "Sound has four characteristics: pitch, timbre, loudness and duration. . . Of the four characteristics of sound only duration involves both sound and silence therefore a structure based on durations (rhythmic: phrase, time lengths) is correct (corresponds with the nature of the material) whereas harmonic structure is incorrect (derived from pitch which has no being in silence)." (Cage 1949/1961: 63)

1949/1961: 56). As Cage wrote in his "Credo," he believed "in the use of noise," in the substitution of "organized sound for music" and in the widening of musical materials to the "entire field of sound" (Cage 1961: 3).⁸⁴ The doctrine of experimental music, as envisioned by Cage, includes the disappearance of the oppositions of subject-object, art-life, etc. (1955/1961: 14). Sound is defined as a "transmission in all directions, from the field's center." Each sound is "inextricably synchronous with all other, sounds, non-sounds" (ibidem). Here, the influence of Zen philosophy is as pronounced as that of Varèse, whose definition of music as "organized sound" provided Cage with a starting point.⁸⁵ In a new, experimental music,

nothing takes place but sounds: those that are notated and those that are not. Those that are not notated appear in the written music as silences, opening the doors of the music to the sounds that happen to be in the environment.
(Cage 1957/1961: 7-8)

As any sound may be juxtaposed with any other, "a total sound-space is available" for compositional explorations (p. 8). Thus, the musicians are able to "transform our contemporary awareness of nature's manner of operation into art" (p. 9).⁸⁶ This "manner of operation" implies a simultaneous presence of incongruous

⁸⁴The text, entitled "The future of music: Credo," was originally written in 1937, revised in 1958 and published in *Silence* in 1961.

⁸⁵Cage criticizes Varèse because "rather than dealing with sounds as sounds, he deals with them as Varèse" (Cage 1958/1961: 84). For Cage, apparently, the virtue of compositional originality is a thing of the past, and he has words of praise only for Varèse's "acceptance of all audible phenomena as material proper to music." According to James Pritchett, Cage's notion of organized sound arose independently of Varèse (Pritchett 1993: 16).

⁸⁶This statement is one of the many references to the theory that art should "imitate Nature in her manner of operation" borrowed by Cage from an Indian philosopher, Ananda K. Coomaraswamy (Pritchett 1993: 37). Cage's words almost literally repeat an excerpt from St. Thomas Aquinas's *In libros physicorum Aristotelis expositio* [II.4.] (quoted from Tatarkiewicz, 1960): "Ars imitatur naturam; . . . tota natura ordinatur ad finem suum, ut sic opus naturae videatur, esse opus intelligentiae, dum per determinata media ad certos fines procedit: quod etiam in operando ars imitatur."

types of material in new music, which "is more clearly heard when several loudspeakers or performers are separated in space rather than grouped closely together" (p. 12). As Cage observes,

this music is not concerned with harmoniousness as generally understood, where the quality of harmony results from a blending of several elements. Here we are concerned with the co-existence of dissimilars, and the central points where fusion occurs are many: the ears of the listeners wherever they are.

Cage 1957/1961: 12)

Cage develops this point in "Indeterminacy," the second of his three lectures at Darmstadt ("Composition as process;" 1958). In a composition which is "indeterminate with respect to its performance," every performance is unique and unrepeatable, and it cannot be "grasped as an object in time" (Cage 1958/1961: 39). Instead, it develops in the physical space of the performance and occupies a segment of the physical time. Writing in a deliberately convoluted language, Cage explains:

Where the performance involves several players (two or more) it is advisable for several reasons to separate the performers one from the other, as much as is convenient and in accord with the action and the architectural situation. . . . This separation allows the sounds to issue from their own centers and to interpenetrate in a way which is not obstructed by the conventions of European harmony and theory about relationships and interferences of sounds.

(Cage 1958/1961: 39)

Cage believes that throughout the history of Western art music, a fusion of sound was essential. Therefore, the players in an ensemble were brought as close to each other as possible: together, they produced a coherent work of music, "an object in time" (p. 39). The ideal of new music, however, is "a non-obstruction of sounds;" spatial separation of musicians facilitates "the independent action of each performer." The players should be separated one from another "in order to show a musical recognition of the necessity of space" (p. 40). The placement of the performers may involve their dispersion within the audience itself. This arrangement will heighten "the independent action of each person, which will include mobility on the part of all" (p. 40). The exact temporal coordination of these actions is not necessary; new music does not need a common meter because it is based on the co-presence of

dissimilarities.

This text, although echoing some of the preoccupations of the Darmstadt avant-garde, bears a closer resemblance to notions of spatialization articulated in the American tradition of Ives and Brant.⁸⁷ Cage reiterates Ives's concern for the necessity of the spatial separation of the musicians, and mirrors Brant's reasoning about the necessary dissimilarity of musical materials involved in spatialization and about the absence of exact rhythmic coordination. Nonetheless, Cage does not relate spatial organization to polyphony; he is more interested in simultaneities that cannot be reduced to any common denominator. Moreover, inspired by Eastern philosophy, he posits the need to overcome separation of music from non-music, art from life. This separation usually results in creating "a compendium of masterpieces" and obscures the necessary "interpenetration" of all through all.⁸⁸ Cage requires his listeners and followers "to accept that a sound is a sound and a man is a man, to give up illusions about ideas of order, expressions of sentiment, and all the rest of our inherited aesthetic claptrap." (Cage 1959: 82).

While realizing Cage's requirement, composers, performers, and listeners cease to fulfil their traditional roles. Musical open-mindedness means that "anything goes" (Cage 1974: 178). Musical performances, freed from the constraints of interpreting the score, are not imaginary objects, they have no stable identity which could be independent of their particular circumstances. The "work of music" disappears, replaced by processes, rituals, theatre, happenings. Music is taken beyond the concert hall into all possible (and impossible) spaces: geodesic domes, unused subway platforms, laundromats, fields and forests (Cage 1974: 185). Hence, art is not separated from life. The listeners/musicians create their own musical experiences, everyone is central. Cage considered this "democratization" of music as a

⁸⁷In the texts surveyed for this dissertation, Cage does not refer to either of these composers. Rather, he includes frequent references to Satie and Varèse.

⁸⁸These expressions come from the third lecture "at Darmstadt," entitled "Communication" and, in part, inspired by Dr. Suzuki (Cage 1958/1961: 44-46).

characteristic feature of the American avant-garde to which he belonged. It was prefigured in compositions that

envisage each auditor as central so that the physical circumstances of a concert do not oppose audience to performers but dispose the latter around-among the former, bringing a unique acoustical experience to each pair of ears. . . . Admittedly a situation of this complexity is beyond control, yet it resembles a listener's situation before and after a concert--daily experience, that is.
(Cage 1958/1961: 53)

As the borderline between art and life evaporates, the music loses strict pitch organization, coherent temporal progression and directed motion, and gains indeterminacy of form, diversity of material and simultaneity of unrelated sound events. It moves into the domain of Being, not Becoming (to paraphrase Rochberg's expression of 1963). Thus, while the music reaches into space, it becomes increasingly static.⁸⁹

Temporal stasis, resulting from an absence of directional motion characterizes much of Cage's music, whether spatialized or not. One of the basic characteristics of his style, from *Music of Changes* for piano (1951) to *Freeman Etudes* for violin (1977-80/1989-90), is the absence of continuity, since each sound event appears independently of the others, "floating"--as it were--in silence. In the most radical works from Cage's "indeterminate" period, these sound events are unspecified, and the composer merely delineates an open-ended procedure to be followed.⁹⁰ Here, he constructs "compositional tools" rather than fully articulated musical works.

⁸⁹Cage's association with painters and visual artists, and his linking of spatialization with the renunciation of development in music have been understood by some writers, especially those with a limited expertise in the domain of contemporary music, as symptomatic of this music in general (e.g. Goehr 1992).

⁹⁰In *Variations II* (1961), the performers have at their disposal several transparencies with points and lines. The superimposition of these transparencies creates a pattern deciphered by measuring distances on the lines which define "frequency, amplitude, timbre, duration, and point of occurrence" (Pritchett 1993: 137). The measurements, providing the performer with data about sound events, may be interpreted in any manner, and the action repeated any number of times. The only certain fact about sound placement in this work is its random distribution in space.

In *Variations IV* (1964), Cage devises a way of defining the placement of randomly chosen sound events by dropping transparencies with several points and two circles onto a map of the selected performance space. If any of the lines drawn from one circle through each of the points touches the second circle, this sound should be performed inside the chosen space, if not--outside. The spaces selected for the performance of *Variations IV* could range from a concert hall, through an outdoor space, to a cave. The adherence to this compositional procedure results more often in leaving the concert hall, than in remaining within the boundaries of the traditional "musical" space.

These pieces have been conceived during the most radical phase of Cage's compositional career, in which he focused on conceptual experimentation and performance art (1962-1969). At that time, Cage created an impossible work of zero duration, entitled *0'00"* (1962). Its score consists of one sentence: "In a situation provided with maximum amplification (no feedback), perform a disciplined action" (Pritchett 1993: 138). During the first performance of *0'00"*, Cage typed letters while seated on a squeaky chair; the sounds accompanying his actions were amplified and projected from loudspeakers scattered through the performance space.⁹¹ Thus, a moment from Cage's life was transformed into art, and accidental noise became--at least in his intention--music.⁹² Cage's idea of music as a by-product of an action or a process was further developed by many of his associates, including the organizer of the concert at which *0'00"* was first presented, Alvin Lucier.

⁹¹Rose Art Museum at Brandeis University, May 1965.

⁹²Terry Eagleton describes the dismantling of the boundaries between art and life as the objective of the revolutionary avant-garde who seek the undoing of Art. He wonders: "For if art smashes through the formal contours which demarcate and estrange it from ordinary life, will it not simply succeed in spilling and defusing its critical contents?" (Eagleton 1990: 370).

Alvin Lucier

According to Thomas DeLio 1984, Alvin Lucier was "one of the first American composers to eschew all gestural aspects of traditional composition and to replace them with the pure physical presence of sound" (DeLio 1984: 91). In other words, Lucier exemplifies what Cage has envisioned. In Lucier's music,

materials are never used to fabricate dramatic scenarios nor to express abstract relations. Instead, they are made present to the listener in some heightened way. . . Art's most vital function is to re-create the condition of being--not the experiences of one's life but that perpetual state of transcendence which is the very substance of life.

(DeLio 1984: 104)

The reduction of music to the bare bones of its sound matter, serves to increase the listeners awareness of the process of perceiving and of themselves as perceiving subjects. Simultaneously, the focus on sound as "an end in itself" implies the use of spatialization, because all sounds are primarily spatial. Lucier's own account of his compositional interests reveals a preoccupation with the acoustic peculiarities of space unprecedented among composers (Lucier 1985).

As a truly conceptual artist, Lucier is concerned with reducing the phenomena that he explores in music to their underlying principles. Then, all complexity disappears and "the work may now exist in its purest form" (Lucier 1985: 160). Here, "the work" designates a composition like, for instance, *Music for solo performer* (1965) in which brain waves (registered live and amplified) are used to control a battery of percussion instruments and loudspeakers dispersed in space.

In a series of such works, Lucier studies the acoustic characteristics of natural and architectural spaces (1968-72). A different set of compositions explores "the spatial characteristics of sound itself," such as standing waves, phantom sonic images in space, diffractive properties of sound, etc. (Lucier 1985: 145). One of these works, entitled *Outlines of Persons and Things* (1976) "makes the inaudible audible" through the exploration of acoustic shadows (changes of timbre caused by the presence of an object between the sound source and the listener). As Lucier explains, "in order to perceive the shadow vividly, one of the three components in the system--sound

source, person or thing around which sounds flow, or listener--must move, so that comparisons in time may be made." (Lucier 1985: 148-149).

Thus, it is possible to "uncover aspects of sound which we seldom hear because of our concern with musical language" (p. 149). Appropriately, Lucier's work makes use of acoustic testing equipment, sine wave oscillators, etc. The latter are chosen "because of their purity. . . They enable the listener to perceive the geographical placement of sound in space" (p. 155). The process of testing and exploring by the listeners-performers actively involves them in the discovery of the acoustic properties of rooms, objects, instruments, etc. The emphasis on process, on space, on personal experience is here equivalent to a renunciation of musical structure and high-level organization, in short, to the abandonment of composing in the traditional sense of this term.

Lucier's works display a continuity that "often consists simply in letting the sound material flow according to its own laws" (p. 156). The evolution of this material depends on features of the studied system, which may, for instance, consist of a very long wire stretched across a building which resonates in an unpredictable manner. In *Music on a Long Thin Wire* (1977), variations "caused by fatigue, heating, cooling, air currents, expansion and contraction, and other physical changes in the system or the environment determine the pitch, harmonic, timbral, rhythmic and other musical parameters" of the resonating wire (p. 150). As Cage wrote in *Empty Words*, the composer just sets a process going, and observes the result (Cage 1974: 145). For Lucier, as for Cage, "language or structure interferes with the clarity of the perception of the phenomenon to be explored" (p. 159). Non-musical ideas, such as programmatic ones, also distract, directing the attention away from a sounding process--the expected focus of the listener's perception. Yet, often, there is no concert to attend, no performers to applaud. The context for "musical" explorations has been drastically revised.

R. Murray Schafer's theatre of confluence

The focus on the perceptual experience and the self-awareness of each listener, which characterizes Lucier's acoustic experiments, is also an important feature of the *theatre of confluence* proposed and realized by R. Murray Schafer (Schafer 1991a).⁹³ The Canadian composer has developed this form of music theatre over the course of thirty years; his monumental cycle of musical/theatrical works, *Patria*, still awaits its completion (Mackenzie 1992). Inspired by projects of Bauhaus artists, such as Andreas Weininger (whose spherical theatre predates Stockhausen's designs, cf. Section 3.4), Schafer envisioned a theatre, which would join together all the arts in a new form of "confluence" (a modern *Gesamtkunstwerk*) and, thus, imitate life itself which is "the original multi-media experience" (Schafer 1991a: 32). The privileged position of music among the arts is justified by Schafer's belief in the primacy of hearing: "If the sense of touch is the most intimate of the senses, then the sense of hearing, it appears, is the next best approximation of this intimacy. Hearing is like touching at a distance." (Schafer 1991a: 41-42).

For Schafer, "all art should lead to altered states of consciousness" (p. 33). The purpose of art is to "affect a change in our existential condition" (Schafer 1991a: 87). The role of the artist is "to assist in regaining the spirit lost in the long evolution of civilization" (p. 102). Therefore, theatre, involved in "the recovery of the sacred," should become a form of ritual. To this purpose, it requires a change of context, new performance spaces, new means of expression (p. 90). The distinction between audiences and performers should be overcome, the separation of art and life should disappear. Here, Schafer gives a new twist to Cage's idea of the dissolution of art into life (or transforming life into art). His musical/theatrical works have a lofty purpose: "What they will reveal is man subdued by reverence for nature and the cosmos. What they will reveal is human dependence on an environment consisting of all things understood, misunderstood, and mysterious." (p. 102).

Schafer expresses a profound dissatisfaction with modern theatre buildings as

⁹³ I discuss spatial aspects of Schafer's music in Chapter VIII.

"impediments to the existential changes we would like to achieve in those who attend our productions" (p. 159). Therefore, for instance, in the reenactment of the myth of Theseus and Ariadne, *Patria 5: The Crown of Ariadne*, the theatrical action should take place at the seashore, with a labyrinth set on sand and then burned in the dramatic conclusion of this work (p. 158). Ideally, of course, the composer would like to have a story presented "during a lull in a Dionysian marathon of dancing, indulged in by the whole audience" (ibidem). So far, his search for a suitable performance space on both shores of Canada has been futile. The work needs a large surface of water (theatrical reason) which should be relatively quiet (musical reason). Canadian beaches are either too populated or too noisy for this enterprise.

The next segment of the *Patria* cycle, *Ra*, goes further in the focus on the existential transformation required of the audience. Here, initiates are conducted through a mystery ritual, an all-night experience in a specially prepared setting. The ritual, appealing strongly to senses which function best in darkness (touch, hearing and smell), requires 25-30 locales, both indoors and outdoors (Schafer 1991a: 172). Participants wander through this labyrinth, encountering gods, meditating, preparing a feast, etc. As the composer writes, "the itinerary of active and passive episodes, participating, observing, walking, sitting, standing and lying down were as vital in the structure as any pacing of music and dialogue." (p. 177).

Schafer's theatre verges on creating a new religion. Music, and drama have subordinate roles in his grand project, because the composer has ambitions not just "to entertain theatre customers but to induce a radical change in their existential status" (p. 177). In other words, he is composing a work of human existence in time and space. Thus, music, having transversed a full circle, comes back to its original involvement in religious rituals (e.g. the consecration of the wall of Jerusalem discussed in section 3.1). The problem is that artistic ritual is not "real" in the way a religious ritual is to believers participating in what they consider a sacred action. Regardless of whether Schafer's theatre succeeds in its ultimate, existential goal, its musical layer has aesthetic values of its own and constitutes a significant contribution to the development of the idea of music in space.

Conclusion

Music has always been spatial, but not always spatialized. Various spatial aspects of this art have risen to prominence at different stages of its history. Before the emergence of the concept of the "musical work," the bodily-spatial experiences of the listeners and performers constituted important factors of the musical experience. Musical spatiality relating to the acoustic conditions of performance (types of enclosures, outdoor environments) influenced sound ideals of different times and places. The location of musicians or sound sources within the space of performance has become important only when composers began to notate all the features of the "musical work." Since spatial features of sound have been its least noticeable characteristics, their full musical articulation has occurred relatively late in this development, during the 20th century.

Modern spatialization has privileged these aspects of musical spatiality which are associated with patterns of distribution of sound in space. Mahler, Ives, and Brant have linked spatialization to polyphony (i.e. the simultaneity of multiple layers separated in space). Varèse's vision of sound masses projected into space has endowed sounds with a tangibility of material objects; this tendency has been further articulated in electroacoustic music (section 3.3). In contrast to these two areas of spatialization, speculative theories proposed by Stockhausen (serialization of direction) and Boulez (spatial intervals) have not survived the test of time (section 3.4). At present, composers often attribute to space the role of clarification of dense textures and segregation of polyphonic layers. This preference implies an existence of "textures" and "layers" before their spatialization occurs; thus, it indirectly suggests a continuous hold of the "work-concept" on compositional thinking. Many contemporary composers tend to specify all details of their musical artefacts, from pitch-rhythm structure, through instrumentation, down to the level of sound location. The conceptual experiments of Cage and his followers (section 3.5), with their focus on perceptual experiences (in space, of space), have not permanently transformed the way that music is conceived of. Spatialization has become yet another feature of musical *works*, which are envisioned in the auditory reality of sound.