Chapter 11

Considering Space in Recorded Music

William Moylan

Background

The spatial qualities inherent to music recordings primarily function at two levels of the structure; one LaRue calls the ‘large dimension’ and the other at a ‘middle dimension’. Each level has distinct and unique spatial qualities. These qualities contribute greatly to shaping recorded music at these two primary structural dimensions. It is most common to have spatial elements or relationships of spatial qualities exist or function at these two primary levels, with spatial qualities also existing at lower structural levels; evaluating these levels brings a focus on materials from the subtlest of activity in microanalysis, to middle-analysis (of middle dimension materials and activity), and macro-analysis (at the highest structural level).

The two levels of middle and large dimension serve as meaningful references for the study of spatial relationships in recorded music, as they dominate the listeners’ conception of the music recording and are the materials directly crafted in production practice. These levels can be defined as (1) the overall sound of the recording/music and (2) the qualities and relationships of the individual sound sources or groups of sound sources contained in the recording/music.

The spatial elements of these two dimensions are outlined in Table 11.1.

Spatial Qualities of the Overall Sound

The spatial qualities of the level of the overall sound are (1) the characteristics of the perceived performance environment and (2) the dimensions of the sound stage.

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Table 11.1 The spatial qualities of music recordings in the two primary structural levels

<table>
<thead>
<tr>
<th>Overall sound</th>
<th>Sound stage dimensions</th>
<th>Perceived performance environment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Individual sound sources</strong></td>
<td>Distance location</td>
<td>Image size (width)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The perceived performance environment (PPE) is the overall space where the 'performance' that is the music 'recording' is heard as taking place. It is the environment of the sound stage. This environment binds all sound sources and their separate environments into a single performance area, with its own global environmental characteristics.¹

The characteristics of the perceived performance environment are (1) any frequency alterations to the overall sound of the recording (incorporating bass ratio), (2) how those alterations unfold over time, (3) reverb time and density, (4) pre-delay and the spacing of reflections in the early time field,⁶ (5) ratio of direct to reverberant sound, and (6) unfolding dynamic relationships between the direct sound and reflections/reverberation.⁷ These aspects of the PPE are created by any environmental characteristics applied to the overall programme, and/or the environmental characteristics of important, prominent or unique sound sources within the recording.

This brings the PPE to establish a context for the music: an overall space within which the listener 'hears' or 'conceives' the piece of music as existing (see Figure 11.1).

The sound stage is the singular area occupied by all of the sound sources of the music, as an aggregate or group. It has an apparent physical size of width and depth that are defined at the level of the individual sound source: (1) the dimension of width is defined by the furthest right and the furthest left sound (lateral localization) and (2) the dimension of depth is defined by the most distant sound source and the closest sound source. The size of the sound stage can be

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¹ Ibid., p. 54.
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PERCEIVED PERFORMANCE ENVIRONMENT

Figure 11.1 Spatial dimensions of the overall sound

fluid, with potential to change size (bringing the listener to different relationships to the music); the sound stage also has the potential to establish and maintain a stable context for the music, as a fixed area within which all of the musical activity is perceived as taking place (see Figure 11.2).

Phil Ramone shares:

The most effective mixes take full advantage of psychoacoustics, which is why I mix in two dimensions: in stereo and in depth. Creating a good layer from front to back and left to right offers depth and allows the instruments to breathe, which amplifies their tonal qualities. It also brings clarity to the mix.\(^8\)

\textit{Spatial Qualities of Individual Sound Sources or Groups of Sound Sources}

Individual sound sources in music recordings are located on the sound stage at a specific distance from the listener (distance location), and at a specific location in the stereo field (lateral location). Further, the lateral image will have a width that can vary from a very narrowly defined point in space up to a size that can occupy the entire potential 90-degree span of the stereo sound stage. A point source image occupies a narrow, precise point on the sound stage; a spread image occupies an area between two boundaries, its size can vary greatly. Any group of sound sources can have the same qualities, and be placed as a section within the ensemble on

Figure 11.2 Individual sound sources placed on a sound stage

the sound stage. In surround sound, spread images can completely immerse the
listener or occupy any sized area.

Sounds or groups of sound sources are often placed in their own environments. The qualities of environments fuse with the sound quality of their sound sources to create an overall timbre, and also provide the illusion of placement in a unique physical space. These created environments may be realistic or have sound qualities that defy our natural physics, described as ‘the appearance of a reality that could not actually exist – a pseudo-reality, created in synthetic space’ by Moorefield.9

Environments can impart a quality of depth, or a front-to-back area to a sound though this is not actual distance location – which fixes the ‘front edge’ of the sound on the sound stage, by the amount of low-energy detail present in the sound source’s timbre.10 The characteristics of environmental cues can be calculated as time, amplitude and frequency anomalies of the reflections of the direct sound in the captured or created environment.11

Sound sources are not placed at unique elevations in two channel or surround recordings, as elevation angles cannot be reproduced by loudspeakers located on

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10 Blauert, *Spatial Hearing*, pp. 118, 123.
the same median plane. Some conceptualization of perceived elevation related to pitch/frequency level does exist on a limited basis, but has minimal actual influence on perceived elevation of sounds and differs between individuals. Allan Moore’s soundbox representing ‘virtual textural space’ utilizes vertical placement as one of its four dimensions, where ‘the frequency of sound determines its placement on the vertical plane, with higher frequencies perceived to be placed in the upper zone of the soundbox and lower frequencies occupying the lower section’. Gibson presents a similar concept aligning pitch/frequency with elevation. It is important to note this is not an element of the actual spatial locations and relationships of sounds, but rather a conceptualization of vertical placement of pitch (representing register), much aligned with the concepts of ‘pitch density’ and ‘timbral balance;’ this element is therefore not incorporated into this exploration of spatial dimensions in recorded music.

Some Fundamental Analysis Questions and the Origins of a Methodology

This presents a start for evaluating impacts of space on music, its expression, and its materials. This basic outline of analysis questions, and this rudimentary premise for the initiation of a methodology to understand the content, construction and function of spatial materials are offered to supplement and incorporate the work of other scholars and to provide some point of reference as we move forward in exploring these elements.

Some Fundamental Analysis Questions

The fundamental questions for evaluating the impact of spatial characteristics on music (music recordings) are broad, encompassing the grandest and the subtlest detail. This approach requires an understanding that spatial qualities can be characterized by (1) the qualities of their states or characteristics – as unchanging attributes and dimensions – and by (2) any activity of changing states within any

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17 Moylan, Understanding and Crafting the Mix, pp. 225–9.
of the spatial dimensions, as exhibited by either individual sources, groups of sources, or by the overall texture.

This approach is also concerned with how spatial qualities can serve to create a context for the piece of music or for musical materials, and how they can provide enhancement of musical materials or ideas. It can also be extended to the possibility that spatial qualities have the potential to be or to generate musical materials in and of themselves.²⁻ It is important to remember that the term ‘spatial qualities’ refers to all of those outlined in Table 11.1, and that any of those qualities may be more active or more significant at any point in time, and at any structural level (small dimension, middle dimension, or large dimension).

Table 11.2 is a rudimentary outline to begin exploration.

Table 11.2  Some fundamental questions towards evaluating the spatial qualities of recorded music

In the following table ‘it’ is the activity or state(s) of distance, stereo or surround location, environmental characteristics, perceived performance environment, and/or sound stage dimensions.

- In what way does ‘it’ impact the musical material?
- In what way does ‘it’ enhance (contribute to) the musical message, musical meaning, or the delivery of the musical material?

Does ‘it’ …
- Represent substantive material or ornamental embellishment?
- Shape the musical idea(s)?
- Impart character to musical materials?
- Impact the music directly?
- Shape the musical experience of the listener?

- Is the activity or state(s) of any individual spatial quality a musical idea in itself?
- In what way does ‘it’ impact the musical material?
- In what way does ‘it’ enhance (contribute to) the musical message, musical meaning, or the delivery of the musical material?

Does ‘it’ …
- Represent substantive material or ornamental embellishment?
- Shape the musical idea(s)?
- Impart character to musical materials?
- Impact the music directly?
- Shape the musical experience of the listener?

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Origins of a Methodology for the Evaluation of Space in Music Recordings

A basic theoretical framework is proposed as the origin of a methodology for the evaluation of space in music recordings. This methodology will incorporate three basic activities: collection of information on the spatial elements, evaluating the content and characteristics of that data, and arriving at conclusions of the states and activities of the spatial elements and their impacts.¹⁹

Timelines will assist in collecting and analysing data. A one-page large dimension timeline can document the major structural divisions of the piece and their length; data on overall sound dimensions can be added to this in the following stages. A longer middle-dimension timeline with enough space to clearly show changes of distance locations and/or phantom image locations, and that displays entrances and exits of sound sources, will be of great assistance.

Collection  Information on all of the spatial elements (distance, stereo or surround location, environmental characteristics, perceived performance environment and sound stage dimensions) are collected, as they exist at the middle and large dimensions; activity in the small dimension presents itself as subtle detail within the middle dimension.

The soundbox¹⁰ can be used to notate sources for distance and lateral placement. The following sound stage diagram for a two-channel stereo recording can also be used for these purposes (see Figure 11.3).

![Sound Stage Diagram](image)

Figure 11.3  Stereo sound stage with distance designations

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²⁰ Moore, *Rock*, p. 121.
Figure 11.4  Surround sound stage with distance circles

For surround sound recordings the following diagram can be used. It will also document distance of sound sources from the listener location as well as lateral angle and phantom image sizes and locations (see Figure 11.4).

These diagrams present data in sections of time of stable activity. When sources change locations or sizes, or sources exit or enter the texture multiple diagrams or X-Y graphs are used. An alternative to sound stage or soundbox diagrams is to plot the spatial dimension against a timeline such as the following example (see Figure 11.5):

Spectral and time characteristics and dimensions of environments of individual or groups of sound sources, and of the perceived performance environment are documented. These are most often stable throughout the piece of music, but changes at major structural sections can occur.\(^\text{21}\)

**Evaluation**  The ‘evaluation’ step examines data collected to determine the characteristics and usage of the spatial dimensions. Table 11.3 forms a rudimentary framework for initial evaluation, knowing each piece of music will be unique in some way and thus will need a flexible set of criteria for evaluation:

\(^{21}\) Moylan, *Understanding and Crafting the Mix*, pp. 176–223.
Figure 11.5 'A Day in the Life' from *Sgt. Pepper's Lonely Hearts Club Band*, stereo sound location graph, measures 1–34

Table 11.3 A rudimentary framework for evaluation of spatial dimension characteristics

- Number of states of an element (distance location or image sizes and locations)
- Number and types of different characteristics (individual environments and PPE)
- Rate and degree of changes of any element (especially image locations)
- Amount of activity in each element (that is, how often do sound stage dimensions change)
- Boundaries of ranges/states (that is, furthest left and right; nearest and furthest; longest and shortest decay times; etc.)
- Patterns of changes, speed of changes, rhythms of changes
- Patterns of characteristics and states (that is, similarities of certain environmental characteristics; certain image sizes; certain depth of sound stage location groupings)
- Identification of preferred or predominant types or characteristics
- Identification of characteristic use of elements
- Identification of unique use of spatial elements
Conclusions  Conclusions result from a study of the characteristics and usage of the spatial dimensions from Evaluation, to identify how they function and contribute to the shape, motion and message of the music. The uniqueness of materials, of usage and functions of spatial dimensions will become evident and understood here. Pertinent conclusions may take the form of some, all or none from the following Table 11.4:

Table 11.4 Potential topics for conclusions on the functions and usage of spatial dimensions

- Does the song establish a typical use of spatial dimensions (and coupling with musical materials) conforming to normative practices, or does it deviate from the norm?
- Has a unique language and stylistic usage of elements been established?
- Do spatial elements create a context appropriate to the musical conception and message of the song (overall dimensions)?
- Do spatial elements create relationships and characters appropriate for the musical materials they present and appropriate for the relative significance/importance of the materials to the texture/music (individual sound sources)?
- How do the individual spatial dimensions contribute to or create motion or movement in the song?
- How do the individual spatial dimensions contribute to or create shape and structure in the song?
- What spatial dimensions are used structurally as musical ideas and which are ornamental, embellishing the musical material?
- Where do extremes of states or activity occur structurally?
- Where do changes of the sound stage or perceived performance environment occur structurally?
- What unique structural design elements exist?

Exploring the Roles of Space in Music: At the Level of Individual Sound Sources

This section examines some of the roles of space in music at the level of the individual sound source, or small groups of sound sources. This structural level is also where musical materials (melodies, harmonies, rhythms, and so on) exist in their most complete and immediate forms.

The qualities of spatial elements in the music, and their impacts are explored through several different recordings and versions of The Beatles' 'While My Guitar Gently Weeps'.
**Distance Location**

Distance is the space between the listener and the music, the sound stage, and/or to an individual sound source. In creating or capturing a music recording, sounds are situated at a distance to the listener.

This amount of distance can play a significant role in shaping musical impacts and sound characteristics. Its impacts can be manifest in the listener’s connection to the music and the musical material, the immediacy of the musical message, and a sense of context for the sound stage and the musical texture. Most important in terms of distance is the placement of the lead vocal; it establishes a position of the phonographic narrative, ‘as the aural index of the artist’s persona and represented emotions’. ¹²

Some important observations are:

**Table 11.5 Potential impacts of distance location**

<table>
<thead>
<tr>
<th>1. <strong>Level of intimacy with the source:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Very near to listener?</td>
</tr>
<tr>
<td>Heard from afar?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. <strong>Degree of connection of the listener with the music and its message:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong connection?</td>
</tr>
<tr>
<td>Some detachment?</td>
</tr>
</tbody>
</table>

**In Each: to what degree?**

In these ways the physical presence of the voice and instruments, coupled with their musical materials may be transformed. The listener is brought into a physical relationship to the music; they can be drawn into becoming part of the ‘story’ (music) or observing the ‘story’ (music) from some distance. Either way, the relationship imparts an impact on the musical experience (see Figures 11.6 and 11.7).

For the *LOVE* version of ‘While My Guitar Gently Weeps’, the distance locations of the George Harrison lead vocal and guitar pull the listener into an intimate relationship to the musical material and the message of the music. There is a sense of closeness and a strong connection in these parts and, though a bit less so, the solo cello line during the material through the first verse. These are dramatically different from the more detached string parts of the chorus. In the chorus the sound stage changes in width and depth, although the distance locations

"While My Guitar Gently Weeps," Introduction through Verse 1

and relationships of guitar and vocals do not change markedly. Careful attention will reveal subtle changes to the image size and the environmental characteristics of Harrison’s vocal, note: this is not a change of distance location – it is a change of the sound quality of the vocal’s environment coupled with a broadening of the phantom image.

"While My Guitar Gently Weeps," Chorus 1

Figure 11.6 Sound source locations, beginning through verse 1 of ‘While My Guitar Gently Weeps,’ LOVE version

Figure 11.7 Sound source locations, first chorus of ‘While My Guitar Gently Weeps,’ LOVE version
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"While My Guitar Gently Weeps," Introduction through Verse 1

![Diagram](http://site.ebrary.com/lc/digcon/10583437?ppg=198)

Figure 11.8 Sound source locations, beginning through verse 1 of 'While My Guitar Gently Weeps,' White Album version

The original White Album version of 'While My Guitar Gently Weeps' contains striking differences in the character and placement of the lead vocal and the acoustic guitar (see Figure 11.8).

There is a substantial difference in the distance location of Harrison's acoustic guitar and his lead vocal in comparison to those locations we observed in LOVE. They are no longer very close to the listener, within the listener's personal space. They are now further away, and more detached from the listener. The listener is now observing the story from an appreciable distance, instead of being intimately connected with Harrison the storyteller.

Do these different distance qualities bring each version to be communicating something different? Or do they bring each song to communicate the same message differently? Perhaps both are possible when proposed from different perspectives.

It is clear the poignant, meditative, and sombre version of 'While My Guitar Gently Weeps' from LOVE is profoundly different musically from the 'raucous, electric' version on the White Album.

The question remains: just how do the dimensions of distance location and sound source size and location bring the listener to a different relationship to - and understanding of - the music and its message? And how do these factors shape music's substance?

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23 Moylan, Understanding and Crafting the Mix, pp. 190–91.
The answers will be found in an examination of the complete song, with its overall spatial characteristics and the spatial dimensions of the individual sources as they present, shape and/or propel the musical materials and the song’s expression and message.

_Lateral Imaging to Enhance Music_

The placement of sources along the width of the sound stage brings lateral imaging. Sounds are provided with locations and size.

In both of the above versions of ‘While My Guitar Gently Weeps’ the lead vocal is mixed to the centre of the sound stage, but the _White Album_ vocal image is considerably wider. In this way it remains prominent although it is at a greater distance than the _LOVE_ version; notice, it is also at a lower loudness level. Zak describes the ‘multifaceted nature of prominence perception’ noting ‘a sound’s stereo placement can affect its prominence’ and that prominence ‘emcompasses all of the other parameters of the mix’ that allows for this perception.\(^{25}\)

Consider these as well: Does the width of the lead vocal in each version contribute in other ways? Does this image width in the _White Album_ version that brings the vocal more prominence also bring it more significance?

Important general observations regarding image size and location begins with identifying:

- Where are the sound sources on the sound stage?
- Where are the musical materials on the sound stage?
- What size are the sound sources?
- What size are the musical materials?

This leads to pertinent observations of image size, using the following Table 11.6 for a beginning.

<table>
<thead>
<tr>
<th>Table 11.6 Image size concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Amount of physical presence in the mix (space occupied on the sound stage).</td>
</tr>
<tr>
<td>• Prominence that is not related to loudness.</td>
</tr>
<tr>
<td>• Is the size of the image proportional to the musical importance of the sound source?</td>
</tr>
<tr>
<td>• Does the size of the source establish a context or reference for other sources?</td>
</tr>
</tbody>
</table>

Table 11.7 Image location concerns

- Is the sound source in a location that separates it from others?
- Does the location of the source provide a level of prominence that is not related to loudness?
- Does the location of the source establish a context or reference for other sources?
- Does the image occupy a location with other sources? If so:
  - Are they presenting similar materials?
  - Do they have similar sound qualities?
  - Do they have similar musical functions?

Table 11.7 brings fundamental questions regarding location of sources. These two tables explore potential ways imaging can enhance, extend the character, or provide ornamentation to musical ideas. The impacts are potentially profound, and these tables are only a starting point for exploration and inquiry. Lateral and distance location can be used for blending or fusing sounds (and their musical ideas) with similar treatments, and various degrees of dissimilar treatments can bring various degrees of contrast, distinctiveness, prominence, and so on.

Allan Moore offers: 'the most important features of the use of this space [horizontal location, provided by the stereo image] are the types and degrees of density filling it (whether thin strands or blocks), and the presence in this space of "holes", that is potential areas left unused'. The 'taxonomy of mixes' he and Ruth Dockwray are devising holds significant promise to help us recognize and understand more deeply certain 'common practices' that have developed in constructing mixes.

Lateral Imaging as Musical Idea

Image location can be extended to be a primary musical idea in itself. Recordings have incorporated 'rhythms of locations' into musical fabrics. In these instances, rhythms are created by the locations of sounds on the sound stage; patterns of locations are presented to the listener, and the repetitions and alterations of these patterns can create musical interest just as the patterns of changing pitches, timbres or harmonies.

Drum solos are common places for rhythms of locations, functioning in parallel with the specific drum and cymbals of the passage; for instance in The Beatles' 'The End' (Abbey Road, 1969) the tom drum rhythms are underscored by their separate far-left and far-right locations, providing a rhythm of location to the drum

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26 Moore, Rock, p. 121.
so lo’s rhythms of time and timbre. In practice this can also appear by repeating the same sound (or different sounds from the same source) and establishing a pattern of soundings from different, specific locations. This is found in the presentations of the ‘cash register’ sounds of the surround version of ‘Money’ by Pink Floyd (Dark Side of the Moon, 2003).

Imaging can be used to ‘enhance the meaning of a song’ by contributing to the delivery and depth of message. Katz discusses the opening of ‘Strawberry Fields Forever’ (Magical Mystery Tour, 1967) where sounds are placed in unlikely positions relative to the listener and exhibit impossible image sizes to create a ‘fantastic disposition of sound that persuades us that ‘nothing is real’’.38

Providing a sound with motion or some level of movement is also found, and can function as a musical gesture in itself or can be used to enhance a musical idea. In ‘Here Comes the Sun’ (Abbey Road, 1969) a Moog glissando moves from left to centre at the end of the song’s introduction; the motion of the sound complements and parallels its change of pitch and becomes an integral part of the musical gesture. Figure 11.6 presents the opening verses of ‘A Day in the Life’ (Sgt. Pepper’s Lonely Hearts Club Band, 1967) where the lead vocal is given a subtle ornamentation of motion. Over the course of this lengthy section, it very gently moves from the right side of the sound stage to the left, with image width varying slightly along the way.

Unique Environments for Any or Every Sound Source

Music recordings can, and often do, place individual sound sources (or smaller groups of sources) in their own, unique environment or ‘performance space’. These create alterations to the timbre, or sound quality of sound sources, as well as provide the sound sources (and their musical materials) with additional spatial dimensions.29 Environments have sound qualities that fuse with the timbre of the instrument/voice to create a new sound. This new timbre may be subtly different from the source without the environment, or substantially transformed.30

The perceived geometry or the ‘illusion of physical dimensions’ of sound source environments contributes to the sound quality and adds spatial characteristics. This allows environments the potential to generate reflections (time elements) and sound quality (frequency elements) for the sound source and to use the environment’s sound to (1) provide colour (timbre) alterations to the instrument or voice (this is considered under ‘echo’ and ‘ambience’ by Zak31 and

30 Moylan, Understanding and Crafting the Mix, pp. 195–201.
31 Zak, Poetics of Rock, pp. 70–85.
under ‘presence’ by Everett\(^3\) or to (2) extend size of the sound source image, as occurred to Harrison’s vocal in the LOVE version of ‘While My Guitar Gently Weeps’ above.

Table 11.8 provides some preliminary considerations for evaluating how music is transformed or enhanced by environments.

<table>
<thead>
<tr>
<th>Environment sound qualities and dimensions</th>
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</thead>
<tbody>
<tr>
<td>Does the environment complement the sound source? The musical material?</td>
</tr>
<tr>
<td>Does the environment enhance the sound source? The musical material?</td>
</tr>
<tr>
<td>What is the size of environment relative to real-world physical size of instrument?</td>
</tr>
<tr>
<td>What is the size of environment related to the type of musical material and its significance?</td>
</tr>
<tr>
<td>Does the environment broaden the sound source image?</td>
</tr>
<tr>
<td>Does the environment deepen the sound source image?</td>
</tr>
<tr>
<td>Does the environment provide the source(s) with other distinguishing qualities?</td>
</tr>
<tr>
<td>Does the environment provide the source or musical material with increased prominence in the musical texture? Significance?</td>
</tr>
</tbody>
</table>

**Exploring Spatial Qualities of the Overall Sound**

The overall texture has a number of dimensions; among these are the spatial aspects of the perceived performance environment (PPE) and the sound stage. These dimensions will (1) provide a context for the music, and (2) establish a point of reference against which activities and states of individual sources are measured and understood.

**Perceived Performance Environment**

The perceived performance environment (PPE) is the space where the song exists. Its size is the geometry and dimensions of the ‘performance space’ of the song, and is conceived as a combination of cues from all sources and any applied characteristics. It is static, or unchanging in its dimensions, although its dimensions may gradually show themselves as the song unfolds. This concept can shape the music in meaningful ways. To understand how, we can begin by considering:

• How is the concept of the song reflected in the size of the song's 'overall space'?
• Is the song bigger than its space? Compatible with? Smaller than?
• Is the song enhanced by its perceived performance environment? In what way?

With the PPE establishing a context for the music as an overall space within which the listener 'hears' the piece of music as existing: we (1) consider the character of this environment and how it complements or shapes the music and (2) consider the state of this environment as static and unchanging, or if it changes we consider when and how.

In usage, the PPE can exist in many states. The following are most common, and others certainly exist.

Common and typical of classical and jazz recordings, the qualities of the PPE are static, and do not change. Recordings intended to capture or replicate a 'live' listening experience will have all of the characteristics of the PPE apparent from beginning to end.

In recordings with more manipulated productions the dimensions of the PPE might unfold, being gradually presented to the listener over time; still, one single environment exists and does not change. The Beatles' 'Here Comes the Sun' is one such recording, where instruments and voices are gradually introduced during the course of the song, and provide the listener with a sense of an expanding and contracting PPE. A single performance space is evident, but the listener is provided with only portions of the environment until the full instrumentation and breadth of the work arrives after two minutes have passed.

Some songs have more than one PPE. This is not common, but this does occur. It may take the form of juxtaposing two or more PPEs as the piece changes from section to section, with striking changes of character. The Beatles' 'A Day in the Life' transports the listener from one PPE to another by way of an orchestral bridge (1:45 to 2:15); Lennon's first section (0:00 to 1:45) has an overall environment that is substantially different from McCartney's section (at 2:15). The listener is then brought to a third PPE at 2:50, then at 3:18 abruptly returning to the first PPE.

**Sound Stage**

It is common to have sources change in distance location and/or horizontal location to the listener, and/or change image width, and still exist within the same overall environment (PPE). This often occurs between major sections, with verses having one set of relationships and choruses another. This is a typical example of the sound stage being used structurally in delivering the message and expression of a song: placing the listener at different perspectives to the musical materials and performers between major sections, while maintaining a consistent point of reference within the single PPE.
As we learned above, the boundaries of the sound stage (left-right width, front-rear distance) are fluid, and have the potential to change as the work unfolds. Returning to the two versions of 'While My Guitar Gently Weeps', we recognize that a change in the width and depth of the sound stage occurred in the *LOVE* version as the introduction, verse one and first chorus unfolded. The White Album version used the sound stage differently: the sound stage boundaries were established at the very beginning, and created a context within which all of the entering instruments and voices were placed and established their locations.

In considering the sound stage and its relationship to the musical materials, Table 11.9 serves as a point of departure for pertinent evaluations and conclusions:

Table 11.9  Considerations of the sound stage

| Where are the [instruments, lead vocal, etc., and their musical parts, etc.]? |
| What size are the [instruments, lead vocal, etc., and their musical parts, etc.]? |
| How far from the listener are the [instruments, lead vocal, etc., and their musical parts, etc.]? |

Where are the boundaries of the sound stage:

- Its front edge?
- Its rear wall?
- Its furthest left sound source and its furthest right sound source?

Where is the listener located in relationship to the front edge of the sound stage?

Surround Sound's Sound Stage and Perceived Performance Environment

Surround sound brings a number of important potential states that can be very different from stereo recordings.

While all but one of the spatial dimensions discussed above remain conceptually unchanged, how they relate to the listener — and to the listener's location — can be markedly different. The medium can surround the listener with the music. This provides potential for a very different experience, with greater flexibility and potentially greater emphasis on the music's spatial qualities.

The overall spatial elements of the perceived performance environment and the sound stage remain. The PPE has the same dimensions and functions in surround as in stereo recordings. The sound stage in surround has the potential of new dimensions from stereo. The differences relate to the potential size of the sound stage, potential size of the sound sources, and the listener's relationship to the sound stage and its sound sources.

The spatial dimensions at the individual sound source level remain unchanged for distance location and lateral location and image size, with the differences that sound sources have the potential to be placed anywhere around the listener and...
have the potential for much greater size. Environments of individual sources (or
groups of sources) have the potential to exist in a very different and unique manner
in surround: the fusion of the direct sound with the reverberant sound that always
occurs in stereo (and in our real-world experiences) may be altered in surround
to place the two entities in different locations,\textsuperscript{33} providing a very different – and
potentially surreal – experience.

The following tables outline the important variables and dimensions of surround
sound’s sound stage and phantom image characteristics (Table 11.10), the unique
potential locations of ambiance (Table 11.11), and the listener’s potential locations
and relationships to the sound stage (Table 11.12):

Table 11.10 Variables and dimensions of the sound stage and phantom images in
surround sound

<table>
<thead>
<tr>
<th>Size of sound stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same as the stereo sound stage</td>
</tr>
<tr>
<td>Wider than stereo, extending the sides</td>
</tr>
<tr>
<td>Multiple Sound Stages in Front and in Back</td>
</tr>
<tr>
<td>Complete Circle, with sounds covering 360°</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location of sound stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>In front of the listener</td>
</tr>
<tr>
<td>Behind the listener</td>
</tr>
<tr>
<td>Wrapping to/around the sides of the listener</td>
</tr>
<tr>
<td>Encircling the listener</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Placement of sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Similar to stereo</td>
</tr>
<tr>
<td>Instruments at sides</td>
</tr>
<tr>
<td>Instruments in back</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Moving sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential for sound sources to move slightly, through 360° around listener</td>
</tr>
</tbody>
</table>

CONSIDERING SPACE IN RECORDED MUSIC

Table 11.11 The potential locations for the placement of ambiance in surround sound recordings

<table>
<thead>
<tr>
<th>Related to sound sources</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fused with the sound source timbre and location</td>
<td></td>
</tr>
<tr>
<td>Placed in different locations from the sound source</td>
<td></td>
</tr>
<tr>
<td>Placed behind the listener</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Related to perceived performance environment</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Room sound surrounding listener</td>
<td></td>
</tr>
<tr>
<td>Stereo sound stage with surround channels used for ambiance</td>
<td></td>
</tr>
</tbody>
</table>

Table 11.12 The listener’s potential locations and relationships to the sound stage in surround sound recordings

<table>
<thead>
<tr>
<th>As observer</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Very close to the front edge of the sound stage</td>
<td></td>
</tr>
<tr>
<td>Some detachment from front of sound stage</td>
<td></td>
</tr>
<tr>
<td>Considerable detachment from the sound stage</td>
<td></td>
</tr>
<tr>
<td>Sound stage or sources behind the listener</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Enveloped within the recording</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Seated within the ensemble and inside the sound stage, immersed in the music and performance</td>
<td></td>
</tr>
<tr>
<td>Surrounded by the music and ambiance (with some detachment – from very little to quite considerable – from the ensemble)</td>
<td></td>
</tr>
</tbody>
</table>

Distance in Surround

In surround sound, the listener’s relationship to the sound stage continues to establish a relationship to the music and its communications (expressions/emotions and meanings). The listener is placed at some distance from the concepts: perhaps intimately close (being very near the vocal’s persona or other sound sources of significance), perhaps at a considerable distance. The relationship of the reverberant energy to the listener, and the use of the rear channels can bring the listener to be observing the performance (recording) within an environment they are experiencing but not necessarily occupying, within an environment they occupy, or even by being seated within the ensemble and its sound stage (especially when instruments are located behind the listener and the rear sides).
Potential distance location of the listener relative to the sound stage extends from largely detached from the sound stage, to very close to the front of the sound stage. These are the same as stereo recordings. Strikingly different in surround is the possibility to place the listener within the sound stage, which will provide a very different presentation of the music to the listener. Phil Ramone shares his approach to mixing a surround sound recording of Elton John’s Radio City Music Hall concert in June of 2004:

The beauty of mixing … in 5.1 surround sound is that it allows us to purposefully design the mix to make the listener feel as though they’re sitting in a certain spot in the venue. I think it’s cool to bring the listener onto the stage, giving them the sense that he or she is standing right next to Elton [John] and his piano. There’s something about that close proximity that allows for a lot of detail to be heard – detail that you would never hear if you were watching the concert in a big arena.34

Location in Surround

Location in surround continues to include the size and lateral location of images, with the concepts discussed above. Obviously, the size of the sound stage can be extended considerably in surround, as lateral boundaries can extend to surround the listener, and the size of images can exist at any size up to 360° around the listener (though difficult in production practice, conceptually this is possible). How the size of the images and locations of the images interrelate with the associated size and locations of the musical materials presented above factor equally in surround.

The separation of sound sources (and their musical materials) and their host environments is possible, and is potentially important. The location and size of ambiance/environment sound can substantially transform the significance, prominence, character and/or sound qualities of sound sources and their musical ideas. This must be factored into an examination of how spatial properties enhance, transform or present music. Figure 11.9 depicts the surround lateral locations of the Lowry organ, tamboura and John Lennon’s vocal from ‘Lucy in the Sky With Diamonds’ (Yellow Submarine, 1999); the placement of the vocal’s ambiance away from the direct sound image is represented by the density of dots.

Surround Sound Stage in Practice

Significant changes in the sound stage occur throughout the surround sound version of ‘While My Guitar Gently Weeps’ from LOVE. The acoustic guitar of the introduction slightly changes to its position and width to arrive at its location in the front-centre anchored sound stage of Figure 11.10. The mix then evolves

Figure 11.9 Surround image placements from ‘Lucy in the Sky with Diamonds’ (Yellow Submarine, 1999)

taking all various entering sources through changes of width and locations in an ever-expanding sound stage to arrive at Figure 11.11’s much wider sound stage.

The dimensions of the sound stage evolve as the music progresses, with the listener gradually becoming more and more immersed in the music of the song, as they are further and further enveloped by the sound stage and the sound sources/musical materials; still, the sound stage does not fully envelop or immerse the listener with instruments or voices from the rear, and a certain degree of observation (and detachment) is maintained. Differences in distance locations and lateral locations and image sizes are also evident and significant.

Listening to this surround version on an accurate surround sound system will provide an experience substantially different from the stereo version discussed
"While My Guitar Gently Weeps" Intro thru Verse 1, meas. 1-24.

Figure 11.10 Surround sound mix of 'While My Guitar Gently Weeps' from LOVE, measures 1–24

above. The musical parts are spaced further apart in the surround mix, and given more room and less competition — and in some ways less connection to one another.

Consider: How are these spatial differences between the stereo and surround mixes significant musically? Do these changes in spatial quality communicate something different (change the concept of the song or its meaning or its substance)? Do these changes in spatial quality bring the materials and their presentations to merely communicate the same substance differently (change the quality of the material as ornamentation, but not alter its substance)?
"While My Guitar Gently Weeps" Chorus 2, meas. 57-72.

Figure 11.11 Surround sound mix of 'While My Guitar Gently Weeps' from LOVE, measures 57-72

In Closing

This represents the beginning of a search for a greater understanding, and not intended to offer an overview of practice, or a theory of principles. It seeks to offer a framework and to start a context for inquiry and for discovery of how space functions in recorded music.
Spatial qualities of recordings are potentially striking, and their sonic significance is undeniable. These spatial qualities can become an integral part of the composition or add important characteristics of many types. They can:

- Transform musical materials and relationships.
- Provide added dimensions to instruments and voices.
- Enhance the overall musicality of the recording.
- Give added meaning and character to a song's musical parts.
- Contribute to a convincing presentation of the song.
- Enliven and enhance the delivery of the message or the emotive expression the song/music is communicating.
- Bring substantive musical material to the song.
- Provide a context or point of reference for the recording/music.

The underlying questions remain: how do we define the activities and states of spatial qualities as musical materials (concepts) or as ornamental embellishments within the musical texture? How do we calculate their impact on the music, their functions and significance?

Discography


