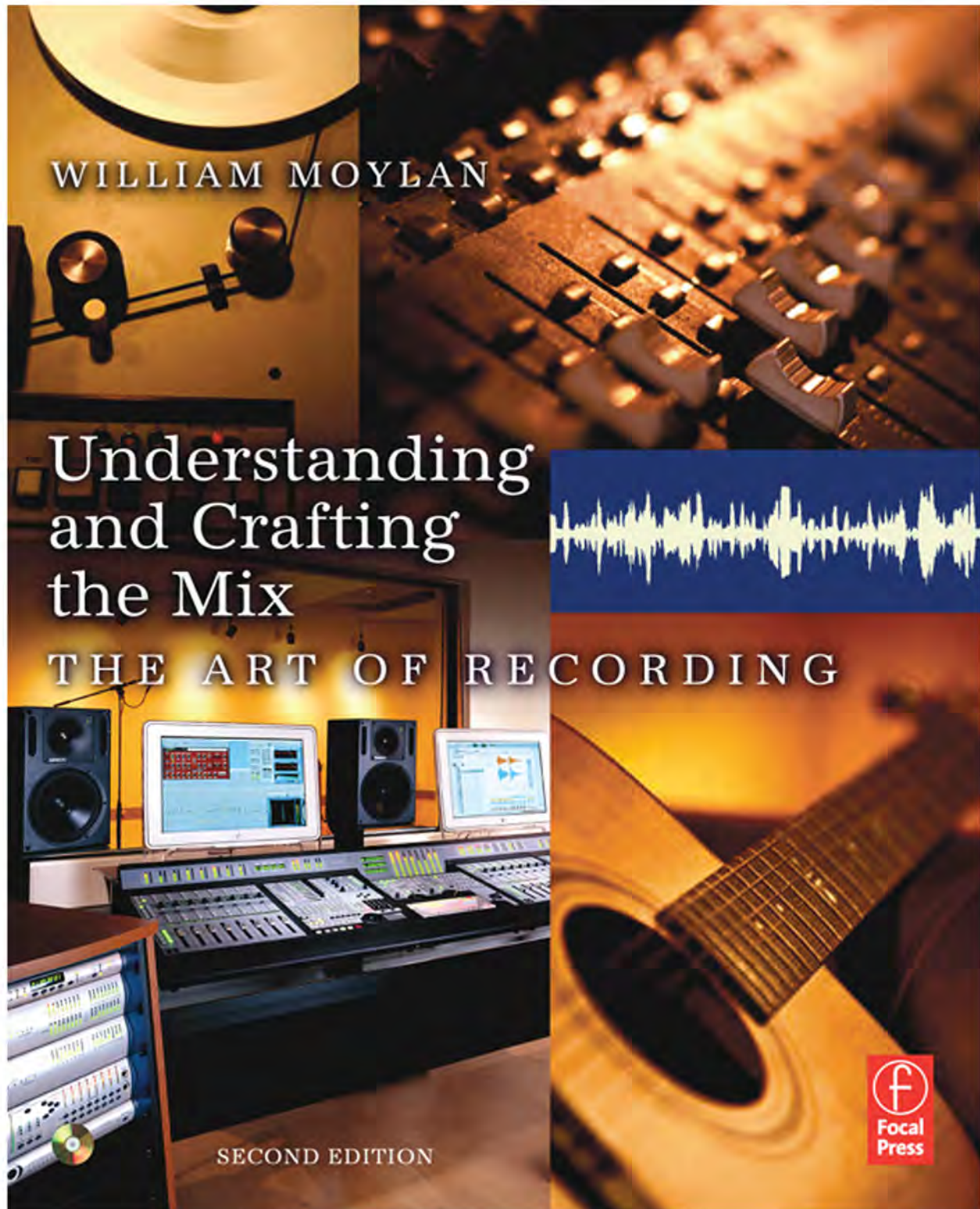




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Part Two

Understanding the Mix:

Developing Listening and
Sound Evaluation Skills

4 Listening and Evaluating Sound for the Audio Professional

People in the audio industry need to listen to and evaluate sound. Carefully evaluating sound, for one reason or another, is an integral part of most positions in the audio industry. Sound must be evaluated in all areas of audio production, manufacturing, and support. These areas are very diverse. They may be equipment performance or microphone placements, music mixes or the technical quality of the signal, or any one of many other possibilities.

Sound is being evaluated by the audio professional in all these cases and more.

Saying “sound is central to audio” is obvious to the point of sounding trivial. It is equally ironic that the audio and music community has not developed a way to clearly communicate meaningful information about sound. No language or vocabulary exists for qualities of sound. Part Two begins the creation of a means and vocabulary to communicate about sound.

While this book is focused on the artistic roles of the recording professional, sound evaluation is important to everyone in the industry who listens to, evaluates, and talks about sound. Part Two of the book can and should be used by anyone in need of developing the ability to understand, evaluate, and communicate about sound. It should be a primary objective of all people in the audio industry to be more sensitive and reliable in their evaluations of sound. While the term “recordist” will still be used in Part Two, it should be interpreted to mean “any audio professional” during discussions of sound evaluation. The sequence of chapters in this part will present a system for understanding and evaluating sound that will substantially develop the reader’s ability when mastered.

It is necessary for all people related to the audio industry to be accurate and consistent in their evaluations of the quality and content of sound and audio. As we have seen, the previous experience, knowledge, cultural

conditioning, and expectations of the listener (in this case the audio professional) have a direct impact on the level of proficiency at which the listener is able to evaluate sound. With increased experience in evaluating sound comes increased skill and accuracy.

The act of listening and the process of evaluating sound can be learned and greatly refined. The following is a presentation of the need for sound evaluation and the listening process, leading to a discussion about how we talk about sound, and the development of listening and sound evaluation skills.

Why Audio Professionals Need to Evaluate Sound

Audio professionals need to evaluate sound to define what they hear, to understand what they hear, and to communicate with one another about sound. These are important aspects of the job functions for almost all people in audio.

Recording engineers and producers, obviously, must have well-developed listening skills because evaluating sound is one of the most important things they do in their work. The need for highly refined skills obviously holds true for composers and performing musicians, especially those involved in the audio-recording processes. All audio professionals who listen to sound share a similar need for these skills. The technical people of the industry, those involved in artistic roles, and those in manufacturing or facility design, or product sales and many others, all must share observations and information about sound.

There are other reasons audio professionals need to evaluate sound in addition to talking about sound in precise and meaningful terms. The recording's sound qualities need to be observed, recognized, and understood to perform a great many jobs in the industry. Nearly all positions approach sound evaluation in a somewhat unique way. In fact, there might be as many reasons (significantly or slightly unique) for evaluating sound as there are job functions within the multitude of positions in the audio industry.

For the recordist, there are additional benefits to sound evaluation, and some will be discussed in detail in later chapters. These include ways to (1) keep track of one's work so that the audio professional can return to those thoughts/activities in the future, (2) plan recording projects out of the studio, (3) understand the work and ideas of others, (4) recreate sounds and musical styles, and many more.

Nearly all people in audio work directly with some aspect of sound. These aspects might be vastly different, yet these people must communicate directly and accurately to share information. In order to share information, sound must first be evaluated and understood by the listener.

Understanding sound begins with perceiving the sound through active attention. One can then recognize what is happening in the sound or recognize the nature of the sound, provided the listener has sufficient knowledge and experience. The listener must know what to listen for (i.e., the artistic elements of sound) and where to find that information (perhaps a particular musical part). This recognition can lead to understanding, given sufficient information. What is understood can be communicated, with the presence of a vocabulary to exchange meaningful information that is based on a common experience.

Talking About Sound

People in the audio industry, as in all industries, work together towards common goals. In order to achieve those goals, people must communicate clearly and effectively. A vocabulary for communicating specific, pertinent information about sound quality does not currently exist. People have been talking about sound for hundreds of years without a vocabulary to describe their actual perceptions and experiences. Instead, people have used imprecise terms to associate other perceptions and experiences to sound— unsuccessfully and inaccurately.

Describing the characteristics of sound quality through associations with the other senses (through terminology such as “dark,” “crisp,” or “bright” sounds) is of little use in communicating precise and meaningful information about the sound source. “Bright” to one person may be associated with a narrow, prominent band of spectral activity around 15 kHz throughout the sound source’s duration. To another person the term may be associated with fast transient response in a broader frequency band around 8 kHz, and present only for the initial third of the sound’s duration. A third person might easily provide a different, yet an equally valid, definition of “bright” within the context of the same sound. The three people would be using different criteria of evaluation and would be identifying markedly different characteristics of the sound source, yet the three people would be calling three potentially quite different sounds the same thing— “bright.” This terminology will not communicate specific information about the sound and will not be universally understood. It will not have the same meaning to all people.

Analogies such as “metallic,” “violin-like,” “buzzing,” or “percussive” might appear to supply more useful information about the sound than the intersensory approach. This is not so. Analogies are, by nature, imprecise. They compare a given sound quality to a sound the individuals already know. A common reference between the individuals attempting to communicate is often absent. Sounds have many possible states of sound quality.

“Violin-like” to one person may actually be quite different to another person. One person’s reference experience of a “violin” sound may be an historic instrument built by Stradivarius and performed by a leading classical artist

at Carnegie Hall. Another person may use the sound of a bluegrass fiddler, performing on a locally crafted instrument in the open air, as their reference for defining the sound quality of a “violin.” The sound references are equally valid for the individuals involved, but the references are far from consistent and will not generate much common ground for communication. The sound qualities of the two sounds are strikingly different. The two people will be referencing different sound characteristics, while using the same term. Certainly there will be strong similarities between these two instrument sounds, but there will be great differences in the subtle details of the sound qualities; it is in these subtle details that quality recordings are created, and where the skills of the recordist must be drawn. An accurate exchange of important information will not occur without a clear communication of this detail.

The imprecision of terminology related to sound quality is at its most extreme when sounds are categorized by mood connotations. Sound qualities are sometimes described in relation to the emotive response they invoke in the listener. The communication of sound quality through terminology such as “somber,” for example, will mean very different things to different people. Such terminology is so imprecise it is useless in communicating meaningful information about sound.

People can only communicate effectively through the use of common experiences or knowledge. The sound source itself, as it exists in its physical dimensions in air, is presently the only common experience between two or more humans.

As we hear sounds, we make many individualized interpretations and personal experiences. These individual interpretations and impressions are present within the human perceptual functions of hearing and evaluating sound. They cause individualized changes of the meaning and content of the sound. Therefore, our interpretations and impressions are of little use in communicating about sound. Humans have few listening experiences that are common between individuals and that are available to function as the reference necessary for a meaningful exchange of information (communication).

This absence of reference experiences and knowledge makes it necessary for the sound source itself to be described. Meaningful communication about sound will not be precise and relevant without such a description.

The states and activities of the physical characteristics of the sound will be described in our communications about sound. This approach to evaluating sound requires knowledge of the physical dimensions of sound and how they are transformed by perception. Meaningful communication between individuals is possible when the actual, physical dimensions of sound are described through defining the activities of its component parts.

By describing the states and activities of the physical components of a sound, people may communicate precise, detailed, and meaningful information. The information must be communicated clearly and objectively. All of

the listener's subjective impressions about the sound, and all subjective descriptions in relation to comparing the sound to other sounds, must be avoided for meaningful communication to occur.

Subjective information does not transfer to another individual. As people attempt to exchange their unique, personal impressions, the lack of a common reference does not allow for the ideas to be accurately exchanged.

Meaningful communication about sound can be accomplished through describing the values and activities of the physical states of sound. Sounds will be described by the characteristics that make them unique. Meaningful information about sound can be communicated through verbally describing the values and activities of the physical states of sound in a general way. Information is communicated in a more detailed and precise manner through graphing the activity, as will be described in the following chapters.

A vocabulary for sound is essential for audio professionals to recognize and understand their perceptions, as well as to convey to others what they hear.

The Listening Process

Recording engineers and other industry professionals must learn to listen in very exacting ways. The profile of the listener discussed in Part One assisted us in identifying how the recordist has different purposes for listening and needs a much higher skill level. It is necessary for audio professionals to be accurate and consistent in the listening process and its observations. Likely the most difficult job of the recordist is listening and paying attention.

Listening skills need to be developed for the recordist to function in their job. They will be focused in their attention and ultimately become systematic in how they listen to hear detail in sound. The recordist will not be listening passively, but rather will be actively engaged in seeking out information with each passing sound. They will be concerned about a multitude of things, from the quality of a performance, to its technical accuracy; from the quality of a microphone selection, to its appropriate placement; from the quality of the signal path, to the inherent sound quality of a signal processor. All of these things and many more might pass through the thoughts of the recordist frequently and regularly throughout any work session. The listening experience of the audio professional will be multidimensional in many ways. All of their work comes back to learning how to listen.

The recordist must acquire a systematic approach to listening that will involve quickly switching between critical and analytical listening information. It will involve quickly switching between levels of detail, or perspective, and focus on various artistic elements and musical materials.

In many ways the recordist's listening process is like a scanner—always moving between types of information and between levels of detail.

Critical Listening versus Analytical Listening

Audio professionals evaluate sound in two ways: *critical listening* and *analytical listening*. Critical listening and analytical listening seek different information from the same sound. Analytical listening evaluates the artistic elements of sound, and critical listening evaluates the perceived parameters. A different understanding of the sound is achieved in each case.

The artistic elements are the functions of the physical dimensions of sound, applied to the artistic message of the recording. We recognize the physical dimensions of sound through our perception, as perceived parameters. This allows understanding of the technical integrity of sound quality to be contrasted with musical meaning and relationships of the artistic elements.

The same aspects of sound quality may provide two different sets of information. This is entirely dependent upon the way we listen to the sound material, evaluating the sound for its own content (critical listening) or evaluating sound for its relationships to context (analytical listening). The recordist must understand how the components of sound function in relation to the musical ideas of a piece of music and the message of the piece itself. These are analytical listening tasks. The audio professional must also understand how the components of sound function to create the impression of a single sound quality, and how they function in relation to the technical quality of the audio signal. These aspects are critical listening tasks.

Analytical listening is the evaluation of the content and the function of the sound in relation to the musical or communication context in which it exists. Analytical listening seeks to define the function (or significance) of the musical material (or sound) to the other musical materials in the structural hierarchy. This type of listening is a detailed observation of the interrelationships of all musical materials, and of any text (lyrics). It will enhance the recordist's understanding of the music being recorded, and will allow the recordist to conceive of the artistic elements as musical materials that interact with traditional aspects of music.

Critical listening is the evaluation of the characteristics of the sound itself. It is the evaluation of the quality of the audio signal (technical integrity) through human perception, and it can be used for the evaluation of sound quality out of the context of a piece of music. Critical listening is the process of evaluating the dimensions of the artistic elements of sound as perceived parameters—out of the context of the music. In critical listening, the states and values of the artistic elements function as subparts of the perceived parameters of sound. These aspects of sound are perceived in relation to their contribution to the characteristics of the sound, or sound quality.

Critical listening seeks to define the perception of the physical dimensions of sound, as the dimensions appear throughout the recording process. It is concerned with making evaluations of the characteristics of the sound itself, without relation to the material surrounding the sound, or to

the meaning of the sound. Critical listening must take place at all levels of listening *perspective* (see below), from the overall program to the minutest aspects of sound.

The Sound Event and Sound Object

The concepts of the *sound event* and the *sound object* assist in understanding how the musical materials (analytical listening) and sound quality (critical listening) are shaped by the artistic elements. A sound event is the shape or design of the musical idea (or abstract sound) as it is experienced over time. The sound object is the perception of the whole musical idea (or abstract sound) at an instant, out of time.

The sound event is a complete musical idea (at any hierarchical level) that is perceived by the states and values of the artistic elements of sound. The term designates a musical event that is perceived as being extended over time, and has significance to the meaning of the work. The sound event is a musical idea perceived by its various dimensions, as shaped by the artistic elements of sound. It is a perception of how the artistic elements of sound are used to provide the musical section with its unique character. The sound event is understood as unfolding and evolving over time, and is used in analytical listening observations.

Sound object refers to sound material out of its original musical context. For example, in a discussion of the sound quality of George Harrison's Gibson J-200 on "Here Comes The Sun" compared to its sound on "While My Guitar Gently Weeps," the two sound qualities of the instrument would be thought of as sound objects during that evaluation and comparison process. A sound object is a conceptualization of a sound as existing out of time, and without relationship to another sound (except its possible direct comparison with another sound object).

The concepts, sound object and sound event, are contrasted at any hierarchical level. They allow analytical listening and critical listening evaluations to be performed, interchangeably and/or simultaneously, on the same sound materials.

These concepts are able to provide an evaluation of the music's use of the artistic elements of sound, in ways that are not necessarily related to the importance or function of the musical materials. Rather, these concepts seek to determine information on the artistic elements (or perceived parameters) themselves, as they exist as singular and unique entities (sound objects), and as they change over time (sound events).

Perspective and Focus

For sound evaluation purposes, the audio professional must be able to understand the artistic elements of sound, how those elements relate to the perceived parameters of sound, and how those two conceptions of sound are used with *perspective* and with *focus*. The concepts of perspective and focus are central to the listening process and evaluating sound. The audience will go through this process in a general and intuitive manner. The audio professional must be thorough and systematized in approaching the listening process.

In order for the message carried by the artistic elements to be perceived, the listener (audience or audio professional) must recognize that important information is being communicated in a certain artistic element. The listener must then decipher the information to understand the message, or recognize the qualities of the sound. The listener will identify the artistic elements that are conveying the important information by scanning the sound material at different perspectives, while focusing attention on the various artistic elements at the various levels of perspective.

Focus is the act of bringing some aspect of sound to the center of one's attention. The listener needs to identify the appropriate, perceived parameter of sound that will become the center (focus) of attention in deciphering the sound information. Further, the listener needs to determine a specific level of detail on which to focus attention.

The *perspective* of the listener determines the level of detail at which the sound material will be perceived. Perspective is the perception of the piece of music (or of sound quality) at a specific level of the structural hierarchy. The content of a hierarchy is entirely dependent upon the nature of the music or program material, at any specific time.

In a musical context, the detail might break down as in Table 4-1. Each level of detail represents a unique perspective from which the material can be perceived. Each perspective will allow the listener to observe different dimensions and activities of the sound material. A perspective might be thought of as a type of distance of the listener from the sound material; the nearer the listener to the material, the more detail the listener is able to perceive. Perspective is the level of detail at which one is listening.

Table 4-1 Example of Hierarchical Levels of Perspective

Level 1	Overall musical texture and form
Level 2	Text (lyrics)
Level 3	Program dynamic contour, timbral balance, sound stage
Level 4	Individual musical parts (melody, harmony, etc.)
Level 5	Groupings of instruments and voices
Level 6	Individual sound sources (instruments and voices)
Level 7	Dynamic relationships of instruments (musical balance)
Level 8	Composite sound of individual sources (timbre and spatial qualities)
Level 9	Pitch, duration, loudness, timbre, space, and duration elements of an individual sound of a specific sound source
Level 10	Dynamic contour; definition of important components of timbre and space of an individual sound of a specific sound source
Level 11	The spectral content (harmonics and overtones) of the individual sound of a specific sound source
Level 12	The spectral envelope (dynamic envelopes of the overtones and harmonics) of that specific sound

The listener may approach any perspective to extract analytical listening information (pertaining to the function of the musical materials and artistic elements at that level of the structural hierarchy) or to extract critical listening information (pertaining to defining the characteristics of the sound itself). Focus, again, is the act of bringing one's attention to the activity and information occurring at a specific perspective of the structural hierarchy, and/or within a particular artistic element or perceived parameter.

Attention to focus and perspective are needed in both critical listening and analytical listening activities, and should be considered before starting any listening session. It is important for the recording professional to define the focus and level of perspective of the listening experience before the sound material begins, as they can shape the listening experience in strikingly different ways for different situations. In many listening situations, all parameters of sound will need to be continually scanned to determine their influence on the integrity of the audio signal, and all artistic elements will need to be scanned to determine their importance as carriers and shapers of the musical message. In other listening situations, the recordist might need to carefully follow a specific artistic element at a specific level of perspective throughout the listening experience. Different situations will require a different approach to listening. It is important that the recording professional have a clear idea of what needs to be the focus of their attention and the level of detail required (perspective) before beginning to listen—or of the need for continually shifting focus and levels of perspective.

In beginning studies it is very important for the listener to have a clear purpose for each listening experience. This will greatly assist the learning process, and will make each listening session more productive and successful.

They should be focused on a specific level of perspective and on a specific aspect of the sound, and should seek to ignore other aspects of sound. They will listen to the material repeatedly with a focus on a new aspect of sound at each repetition. With practice, one will be able to listen to (and recognize and understand what is happening to) many elements “at once.”

Multidimensional Listening Skills

Equal attention must be given to all aspects of sound as, depending on the sound material and purpose of the listening, any perceived parameter of sound or any artistic element may be the correct focus of the listener’s attention. An incorrect focus will cause important information to go unperceived and will cause unimportant information to incorrectly skew the listener’s perception of the material. The recording professional will often face the possibility that a change might happen in any of the dimensions of sound, at any point in time, at any level of perspective. It is necessary that recording professionals hear, recognize, and understand the character of the sound and any changes that might occur. This awareness needs to be cultivated, as it is counter to our learned listening tendencies.

Audio professionals must develop their listening skills to be multidimensional. The listening process involves the potential need to listen to many things simultaneously. Though on one hand impossible, this is in practice often necessary. To accurately evaluate sound, they must learn to:

1. Shift perspective between all levels of detail,
2. Focus on appropriate elements and parameters at all levels of perspective (and not allow their attention to be pulled away to activity in another element or level of perspective), and
3. Shift between analytical listening (for the qualities and relationships of musical material) and critical listening (for the characteristics of the sound itself) to allow the evaluation of sound.

Distractions

It is often difficult for the recordist to keep from being distracted. Maintaining focus on the purpose and intent of the particular listening experience is very important. Common distractions are becoming preoccupied with the music, being drawn to sounds and sound qualities other than those under evaluation, and being curious about how a sound quality was created (as opposed to character of the sound).

Most of us are drawn to a career in recording because of a love of music. When working on a recording, we can lose our focus by becoming engaged with the musicality of the material. This focus is similar to listening for entertainment. However, there is a time and place to listen for entertainment. Most often recordists listen to qualities that are more precise and exacting.

Even when listening within musical contexts, working directly with musical materials, and thinking about the musicality of the recording, the audio professional will be working at a level of perspective that is far removed from the passive music listening experience enjoyed by most people.

While focused on listening to the characteristics of one element of sound, the sound qualities of another element can draw the listener's attention. It is very important that the listener remain mindful of the purpose of the listening experience. For example, if the listening activity is intended to determine the musical balance of the snare drum against the toms, one should not allow oneself to get distracted by the sound quality of the piano.

In evaluating sound, audio professionals must remember that they are seeking to understand the sound that is present. It is possible for the listener to become distracted from listening by their own knowledge of the recording process or by their wanting to learn more about the recording process. At times people are drawn to thinking about how sound qualities were created—equipment, recording techniques, etc. Bringing production concerns into the process of evaluating sound is counterproductive, unless the recordist is specifically trying to identify equipment choices and production techniques, but this is a very different matter.

Listening sessions should have a clearly defined function. If the recordist is listening to determine equipment that may have been used in a recording, then that is the purpose of the session. If the recordist is listening to understand the sound quality of a certain environmental characteristic, then they should be listening to the various components of that sound and not be concerned about identifying the manufacturer or model number or the settings of the device that created the environment.

Personal Development for Listening and Sound Evaluation

The skills and thought processes required for listening and sound evaluation must be learned. The development of any skill requires regular, focused, and attentive practice. Patience is required to work through the many repetitions that will be needed to master all of the skills necessary to accurately evaluate sound. Each individual will develop at a separate pace, as with any other learning.

Memory Development

The recordist will evaluate sound more quickly and accurately with the development of their auditory memory. This will often be accomplished through their ability to recognize patterns in the various aspects of sound. The listener must be conscious of the memory of the sound event, and they

must seek to develop their memory to sustain an impression of the sound long enough to describe, annotate, or graph certain characteristics about the sound event.

Auditory memory can be developed. As one learns what to listen for, and as one understands more about sound and how it is used, the listener's ability to remember material increases proportionally. This is similar to the process of learning to perform pieces of music through listening to recordings of performances and mimicking the performances. With repetition, this seemingly impossible task becomes a skill that is much easier to perform. Listeners often remember more than their confidence allows them to recognize. The listener must learn to explore their memory and immediately check their evaluations to confirm the information.

The human mind seeks to organize objects into patterns. Sound events have states or levels of activity of their component parts that will often tend to fall into an organized pattern. The listener must become sensitive to the possibility of patterns forming in all aspects of the sound event, to allow greater ease in the process of evaluating sound. Recognizing patterns will assist in understanding sound and sequences of sounds, and will make remembering them more possible.

Developing memory is very possible and very important. Considering sound takes place over time and can only exist by atmospheric changes over time, it should be understood that sound is a memory. Sound is an experience that is understood backwards in time. Sound is perceived after it is past, using memory. Sound does not happen now (at a specific moment) but rather it happened then. It can start or stop now, but it exists over a stretch of time (duration).

The reader is encouraged to work through the exercise at the end of this chapter and to return to that exercise regularly during the course of their work in listening skill development.

Success and Improvement

With increased experience in evaluating sound comes increased skill and accuracy. The act of listening and the process of evaluating sound can be learned and become greatly refined.

The reader will continue to become more accurate and consistent in evaluating sound the more they practice the skills and follow the exercises in the following chapters. The development of these skills must be viewed as a long-term undertaking. Some of the skills might seem difficult, or impossible, during the first attempts. The reader must remember their previous experiences might not have prepared them for certain tasks. The skills are, however, very obtainable. Further, the skills are desirable, as the individual

will function at a much higher level of proficiency in the audio industry after they have obtained these evaluation and listening skills.

The mastery of the skills of sound evaluation is a lifelong process, one that should be consistently practiced and itself evaluated. New controls of sound are continually being developed by the audio industry. These new controls create new challenges to the listening abilities of those in the audio industry.

Discovering Sound

Things are present in recorded music that are subtle and difficult to hear. Most people have never really experienced a good number of these subtle dimensions of recordings. When something has never been experienced or perceived, one does not know it exists. It is possible for people to simply not hear some aspect of sound, simply because they do not have an awareness of or sensitivity to that dimension. Once that awareness and sensitivity is developed, those sounds are heard as easily as any other.

In *Personal Knowledge* Michael Polanyi conveys the experience of a medical student attending a course in the X-ray diagnosis of pulmonary diseases. The student watches dark shadows on a fluorescent screen against a patient's chest while listening to the radiologist describe the significance of those shadows in detailed and specific terms. At first the student is puzzled and can only see the shadows of the heart and ribs, with some spidery blotches between them. The student does not see what is being discussed. It appears to be a figment of the radiologist's imagination. As a few weeks progress, and the student continues to look carefully at the X-rays of new cases and listen to the radiologist, a tentative understanding begins to dawn on the student. Gradually the student begins to forget about the ribs and the heart, and starts to see the lungs. With perseverance in maintaining intellectual involvement, the student ultimately perceives many significant details, and a rich panorama is revealed. The student has entered a new world. The student may still see only a fraction of what the seasoned radiologist sees, but the pictures now make definite sense, as do most of the comments made by the instructor.

Many readers will likely discover a new world of sound. Dimensions of sound exist that are out of normal listening experience. We are not aware of those sounds until we learn what they are, and learn to bring the focus of our attention to those elements. Only then can we discover them and begin to understand them.

We have learned to focus our attention on certain aspects of sound. In music, we have learned that pitch relationships will give us the most important information. In speech, we know that the sound qualities of words make up language, and the sound qualities of the speaker will inform us who is talking. We know dynamics will simply enhance the message of these two

communications, and we listen to them in that way. We have been taught that where a musical instrument is playing is not important (and therefore not worth the effort of recognizing the sound characteristics of location and environment), but what pitches they are playing *is* important (and worthy of attention).

The reader will now be asked to perform listening exercises and to evaluate sound in ways that work against these learned (and perhaps natural) listening tendencies. This requires conscious effort, focused attention, patience, and diligence. With the knowledge that the listener is working against natural tendencies, it will make sense that certain things are difficult. This does not mean they are impossible; many people accomplish them daily. Nor does it mean that this way of listening should not take place. This way of listening is necessary to evaluate and understand many aspects of recorded sound that are simply not normally at the center of one's attention. As we know, the audio professional needs to listen in ways and for things that are not part of a layperson's normal listening experiences.

The student took the leap of faith that is necessary in learning. The student believed in the radiologist and continued to try to understand, initially perceiving the material as an illusion, not really present, a figment of the radiologist's imagination. The student reached a moment of revelation when suddenly an image was perceived. It was always there. The student was now able to see it because of increased sensitivity to the possibility of its existence and an understanding of what that existence might be.

If the reader can commit to a similar leap of faith, they may be rewarded with the discovery of a remarkable new world of sound.

Summary

Understanding sound must begin with perceiving sound. This requires active attention, and sufficient knowledge and experience to know what to listen for. One can then recognize what is happening in the sound or recognize the nature of the sound. This recognition can lead to understanding. What is understood can be communicated, given a vocabulary to exchange meaningful information that is based on a common experience.

A system for evaluating sound has been devised and is presented in following chapters. It will provide a means for evaluating sound in its many forms and uses, and will provide a vocabulary that can communicate meaningful information about sound. The audio professional needs to evaluate sound for its aesthetic and artistic elements and its perceived parameters, as they exist in critical listening and analytical listening applications and at all levels of perspective. The system for evaluating sound addresses these concerns, and more.

Exercises

The following exercise should be practiced until you are comfortable with the material covered.

Exercise 4-1

Musical Memory Development Exercise

1. Select a recording of a song you know reasonably well and prepare a time line with measures numbered, up to perhaps 100.
2. Before listening to the recording, sit quietly and try to remember as much detail of the song as you can.
3. Now, write down the song's meter. In your mind, listen to the piece and write down where the major sections begin and end. If you cannot come up with those divisions easily, you might well be able to deduce that information by thinking about the patterns of phrases in the introduction, verses, choruses, etc. Write down as much information as you can.
4. Think carefully about what you wrote and identify aspects you are not certain about—things that need to be determined when you listen to the recording.
5. Now you can listen to the recording, but listen intently for the information you have determined you need. Do not follow your graph. Listen with your eyes closed. Listen to remember what you hear. Do not write while you are listening and do not correct your graph while you are listening.
6. When the song has stopped, write down what you heard in your one listening and correct what you previously wrote. Then repeat steps 4 and 5 until you have created a time line and structure of the song—in as few listening sessions as possible. Check your information one last time while following your graph. All of the information you wrote should be checked for accuracy; make corrections to your graph.
7. Do not get discouraged. Keep trying. If overwhelmed, take a break but return to the exercise in short order.
8. Select another piece of music you know more thoroughly and perform the exercise again.

This exercise can be performed whenever a time line needs to be created. If faced with a new song, listen intently to the song once immediately after sketching a time line. Remember not to write while listening. Listen when it is time to listen. Write what you have recognized and remembered when the music has stopped.

People remember more than they believe they do. If you will trust your memory and use it, your memory will develop. Your confidence will grow as well.

This exercise should be continually modified to incorporate any sound element you need to evaluate. For example, stereo location could replace structure. The purpose of this exercise is to improve your memory for the perceived parameters and the aesthetic and artistic elements of sound—any of them and all of them.
