

# Walter Murch

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**Walter Murch** - Feb 2, 2005 6:12 pm (#2)  
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Murch editing *Cold Mountain* at Old Chapel Studios in London, 2003.

## WOMB TONE

by *Walter Murch*

Hearing is the first of our senses to be switched on, four-and-a-half months after we are conceived. And for the rest of our time in the womb—another four-and-a-half months—we are pickled in a rich brine of sound that permeates and nourishes our developing consciousness: the intimate and varied pulses of our mother's heart and breath; her song and voice; the low rumbling and sudden flights of her intestinal trumpeting; the sudden, mysterious, alluring or frightening fragments of the outside world — all of these swirl ceaselessly around the womb-bound child, with no competition from dormant Sight, Smell, Taste or Touch.



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Birth wakens those four sleepyhead senses and they scramble for the child's attention—a race ultimately won by the darting and powerfully insistent Sight—but there is no circumventing the fact that Sound was there before any of the other senses, waiting in the womb's darkness as consciousness emerged, and was its tender midwife.

So although our mature consciousness may be betrothed to sight, it was suckled by sound, and if we are looking for the source of sound's ability—in all its forms—to move us more deeply than the other senses and occasionally give us a mysterious feeling of

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connectedness to the universe, this primal intimacy is a good place to begin.

One of the infant's first discoveries about the outside world is silence, which was never experienced in the womb. In later life, the absence of sound may come to seem a blessed relief, but for the newly-born, silence must be intensely threatening, with its implications of cessation and death. In radio, accordingly, a gap longer than the distance between a few heartbeats is taboo. In film, however, silence can be a glowing and powerful force if, like any potentially dangerous substance, it is handled correctly.

Another of the infant's momentous discoveries about the world is its synchronization: our mother speaks and we see her lips move, they close and she falls silent; a plate tumbles off the table and crashes to the floor; we clap our hands and hear (as well as feel) the smack of flesh against flesh. Sounds remembered from the womb are discovered to have an external point of origin. The consequent realization that there is a world "outside" separate from the self (which must therefore be somehow "inside") is a profound and earth-shaking discovery, and it deserves more attention than we can give it here. Perhaps it is enough to say that this feeling of separation between the self and the world is a hallmark of human existence, and the source of equal amounts of joy when it is overcome and pain when it is not.

Synchronization of sight and sound, which naturally does not exist in radio, can be the glory or the curse of cinema. A curse, because if overused, a string of images relentlessly chained to literal sound has the tyrannical power to strangle the very things it is trying to represent, stifling the imagination of the audience in the bargain. Yet the accommodating technology of cinema gives us the ability to loosen those chains and to re-associate the film's images with other, carefully-chosen sounds which at first hearing may be "wrong" in the literal sense, but which can offer instead richly descriptive sonic metaphors.

This metaphoric use of sound is one of the most flexible and productive means of opening up a conceptual gap into which the fertile imagination of the audience will reflexively rush, eager (even if unconsciously so) to complete circles that are only suggested, to answer questions that are only half-posed. What each person perceives on screen, then, will have entangled within it fragments of their own personal history, creating that paradoxical state of mass intimacy where—though the audience is being addressed as a whole—each individual feels the film is addressing things known only to him or her.

So the weakness of present-day cinema is paradoxically its strength of representation: it doesn't automatically possess the built-in escape valves of ambiguity that painting, music, literature, black-and-white silent film, and radio have simply by virtue of their sensory incompleteness—an incompleteness that automatically engages the imagination of the viewer/listener as compensation for what can only be suggested by the artist. In film, therefore, we go to considerable lengths to achieve what comes naturally to radio and the other arts: the space to evoke and inspire, rather than to overwhelm and crush, the imagination of the audience.

The essay that follows asks some questions about multilayered density in sound: are there limits to the number and nature of different elements we can superimpose? Can the border between sparse clarity and obscure density be located in advance?

These questions are, at heart, about how many separate ideas the mind can handle at the same time, and on this topic there seems, surprisingly, to be a common thread linking many different realms of human experience—music, Chinese writing, and Dagwood sandwiches, to name a few—and so I hope some of the tentative answers presented here, even though derived from film, will find their fruitful equivalents in radio.

***Note About the Womb Tone Clip:*** This was recorded by my wife, Muriel (aka

*Aggie), who was a midwife for fifteen years and currently works in radio.*

**Before turning the page**, I offer you a nut to crack, whose mysterious meat may help to qualify some of the less-than-obvious differences between sound in film and radio.

Back in the decades B.D. (Before Digital) we mixed to 35mm black-and-white copies of the film in order to save the fragile workprint and, not incidentally, money. Photographically, these 'dupes' were dismal, but in a perverse way they helped the creative process by encouraging us to make the sound as good as possible to compensate for the low quality of the image.

At the completion of the mix, still smarting from those sound-moments we felt we hadn't quite pulled off, we would finally have the opportunity to screen the soundtrack with the 'answer print' - the first high-quality print from the lab. This was always an astonishing moment: if the sound had been good, it was now better, and even those less-than-successful moments seemed passable. It was as if the new print had cast a spell—which in a way is exactly what it had done.

This was not a unique situation by any means: it was a rule of thumb throughout the industry never to let producers or studio executives hear the final mix unless it could be screened with an answer print.

What was going on?

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Walter Murch - Feb 2, 2005 6:22 pm (#3 Total: 60) [Reply](#)

Dense Clarity - Clear Density: pt.1

## DENSE CLARITY - CLEAR DENSITY

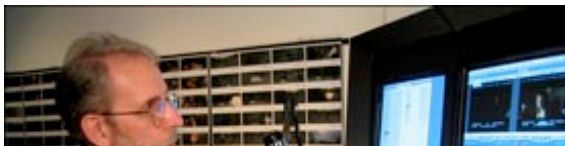
by *Walter Murch*

### Simple and Complex

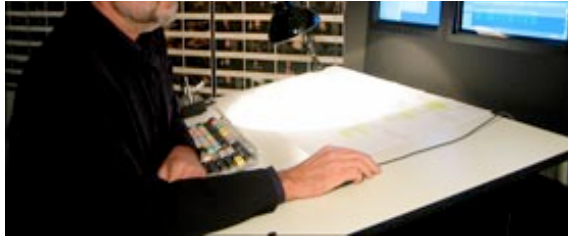
One of the deepest impressions on someone who happens to wander into a film mixing studio is that there is no necessary connection between ends and means. Sometimes, to create the natural simplicity of an ordinary scene between two people, dozens and dozens of soundtracks have to be created and seamlessly blended into one. At other times an apparently complex 'action' soundtrack can be conveyed with just a few carefully selected elements. In other words, it is not always obvious what it took to get the final result: it can be simple to be complex, and complicated to be simple.

The general level of complexity, though, has been steadily increasing over the eight decades since film sound was invented. And starting with Dolby Stereo in the 1970's, continuing with computerized mixing in the 1980's and various digital formats in the 1990's, that increase has accelerated even further. Seventy years ago, for instance, it would not be unusual *for an entire film* to need only fifteen to twenty sound effects. Today that number could be hundreds to thousands of times greater.

Well, the film business is not unique: compare the single-take, single-track 78rpm discs of the 1930's to the multiple-take, multi-track surround-sound CDs of today. Or look at what



has happened with visual effects: compare King Kong of the 1930's to the Jurassic dinosaurs of the 1990's. The general level of detail, fidelity, and what might be called the "hormonal level" of sound and image has been vastly increased, but at the price of much greater complexity in preparation.



Murch editing *Cold Mountain* at Cinelabs in Bucharest, Romania, 2002.

The consequence of this, for sound, is that during the final recording of almost every film there are moments when the balance of dialogue, music, and sound effects will suddenly (and sometimes unpredictably) turn into a logjam so extreme that even the most experienced of directors, editors, and mixers can be overwhelmed by the choices they have to make

So what I'd like to focus on are these 'logjam' moments: how they come about, and how to deal with them when they do. How to choose which sounds should predominate when they can't all be included? Which sounds should play second fiddle? And which sounds - if any - should be eliminated? As difficult as these questions are, and as vulnerable as such choices are to the politics of the filmmaking process, I'd like to suggest some conceptual and practical guidelines for threading your way through, and perhaps even disentangling these logjams.

Or - better yet - not permitting them to occur in the first place.

## Code and Body

To begin to get a handle on this, I'd like you to think about sound in terms of light.

White light, for instance, which looks so simple, is in fact a tangled superimposure of every wavelength (that is to say, every color) of light simultaneously. You can observe this in reverse when you shine a flashlight through a prism and see the white beam fan out into the familiar rainbow of colors from violet (the shortest wavelength of visible light) - through indigo, blue, green, yellow, and orange - to red (the longest wavelength).

Keeping this in mind, I'd now like you to imagine *white sound* - every imaginable sound heard together at the same time: the sound of New York City, for instance - cries and whispers, sirens and shrieks, motors, subways, jackhammers, street music, Grand Opera and Shea Stadium. Now imagine that you could 'shine' this white sound through some kind of magic prism that would reveal to us its hidden spectrum.

Just as the spectrum of colors is bracketed by violet and red, this sound-spectrum will have its own brackets, or limits. Usually, in this kind of discussion, we would now start talking about the lowest audible (20 cycles) and highest audible (20,000 cycles) frequencies of sound. But for the purposes of our discussion I am going to ask you to imagine limits of a completely different conceptual order - something I'll call *Encoded* sound, which I'll put over here on the left (where we had violet); and something else I'll call *Embodied* sound, which I'll put over on the right (red).

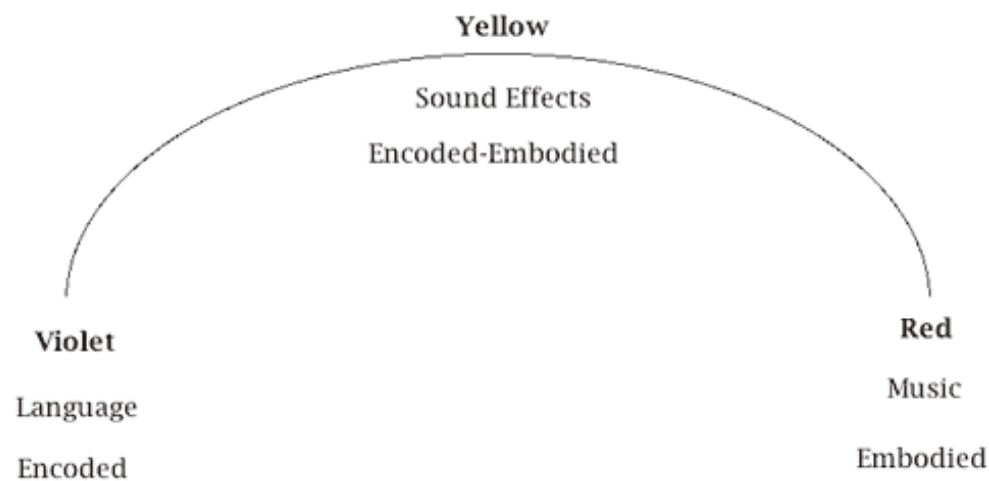
The clearest example of Encoded sound is speech.  
The clearest example of Embodied sound is music.

When you think about it, every language is basically a code, with its own particular set of rules. You have to understand those rules in order to break open the husk of language and extract whatever meaning is inside. Just because we usually do this automatically, without realizing it, doesn't mean it isn't happening. It happens every time someone speaks to you: the meaning of what they are saying is encoded in the words they use. Sound, in this case, is acting simply as a vehicle with which to deliver the code.

Music, however, is completely different: it is sound *experienced directly*, without any code intervening between you and it. Naked. Whatever meaning there is in a piece of music is 'embodied' in the sound itself. This is why music is sometimes called the Universal Language.

What lies between these outer limits? Just as every audible sound falls somewhere between the lower and upper limits of 20 and 20,000 cycles, so all sounds will be found somewhere on this conceptual spectrum from speech to music.

Most sound effects, for instance, fall mid-way: like 'sound-centaurs,' they are half language, half music. Since a sound effect usually refers to something specific - the steam engine of a train, the knocking at a door, the chirping of birds, the firing of a gun - it is not as 'pure' a sound as music. But on the other hand, the language of sound effects, if I may call it that, is more universally and immediately understood than any spoken language.




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**Walter Murch** - Feb 2, 2005 6:27 pm (#4 Total: 60) [Reply](#)

**Dense Clarity - Clear Density: pt.2**

### **Green and Orange**

But now I'm going to throw you a curve (you expected this, I'm sure) and say that in practice things are not quite as simple as I have just made them out to be. There are musical elements that make their way into almost all speech - think of *how* someone says something as a kind of music. For instance, you can usually tell if someone is angry or happy, even if you don't understand what they are saying, just by listening to the tone (the music) of their voice. We understand R2-D2 entirely through the music of his beeps and boops, not from his 'words' (only C-3PO and Luke Skywalker can do that). Stephen Hawking's computerized speech, on the other hand, is perfectly understandable, but monotonous - it has very little musical content - and so we have to listen carefully to what he says, not how he says it.

To the degree that speech has music in it, its 'color' will drift toward the warmer (musical) end of the spectrum. In this regard, R2D2 is warmer than Stephen Hawking, and Mr. Spock is cooler than Rambo.

By the same token, there are elements of code that underlie every piece of music. Just

think of the difficulty of listening to Chinese Opera (unless you are Chinese!). If it seems strange to you, it is because you do not understand its code, its underlying assumptions. In fact, much of your taste in music is dependent on how many musical languages you have become familiar with, and how difficult those languages are. Rock and Roll has a simple underlying code (and a huge audience); modern European classical music has a complicated underlying code (and a smaller audience).

To the extent that this underlying code is an important element in the music, the 'color' of the music will drift toward the cooler (linguistic) end of the spectrum. Schoenberg is cooler than Santana.

And sound effects can mercurially slip away from their home base of yellow towards either edge, tinting themselves warmer and more 'musical,' or cooler and more 'linguistic' in the process. Sometimes a sound effect can be almost pure music. It doesn't declare itself openly *as music* because it is not melodic, but it can have a musical effect on you anyway: think of the dense ("orange") background sounds in *Eraserhead*. And sometimes a sound effect can deliver discrete packets of meaning that are almost like words. A door-knock, for instance, might be a "blue" micro-language that says: "Someone's here!" And certain kinds of footsteps say simply: "Step! Step! Step!"

Such distinctions have a basic function in helping you to classify - conceptually - the sounds for your film. Just as a well-balanced painting will have an interesting and proportioned spread of colors from complementary parts of the spectrum, so the soundtrack of a film will appear balanced and interesting if it is made up of a well-proportioned spread of elements from our spectrum of 'sound-colors.' I would like to emphasize, however, that these colors are completely independent of any emotional tone associated with "warmth" or "coolness." Although I have put music at the red (warm) end of the spectrum, a piece of music can be emotionally cool, just as easily as a line of dialogue - at the cool end of the spectrum - can be emotionally hot.

In addition, there is a practical consideration to all this when it comes to the final mix: It seems that the combination of certain sounds will take on a correspondingly different character depending on which part of the spectrum they come from - some sounds will superimpose transparently and effectively, whereas others will tend to interfere destructively with each other and 'block up,' creating a muddy and unintelligible mix.

Before we get into the specifics of this, though, let me say a few words about the differences of superimposing images and sounds.

## Harmonic and Non-Harmonic

When you look at a painting or a photograph, or the view outside your window, you see distinct areas of color - a yellow dress on a washing line, for instance, outlined against a blue sky. The dress and the sky occupy separate areas of the image. If they didn't - if the foreground dress was transparent, the wavelengths of yellow and blue would *add together* and create a new color - green, in this case. This is just the nature of the way we perceive light.

You can superimpose *sounds*, though, and they still retain their original identity. The notes C, E, and G create something new: a harmonic C-major chord. But if you listen carefully you can still hear the original notes. It is as if, looking at something green, you still also could see the blue and the yellow that went into making it.

And it is a good thing that it works this way, because a film's soundtrack (as well as music itself) is utterly dependent on the ability of different sounds ('notes') to superimpose transparently upon each other, creating new 'chords,' without themselves being transformed into something totally different.

Are there limits to how much superimposure can be achieved?



Well, it depends on what we mean by superimposure. Every note played by every instrument is actually a superimposure of a series of tones. A cello playing "A", for instance, will vibrate strongly at that string's fundamental frequency, say 110 per second. But the string also vibrates at exact multiples of that fundamental: 220, 330, 440, 550, 660, 770, 880, etc. These extra vibrations are called the *harmonic overtones* of the fundamental frequency.

Harmonics, as the name indicates, are sounds whose wave forms are tightly linked - literally 'nested' together. In the example above, 220, 440, and 880 are all higher octaves of the fundamental note "A" (110). And the other harmonics - 330, 550, 660, and 770 - correspond to the notes E, Db, E, and G which, along with A, are the four notes of the A-major chord (A-Db-E-G-A). So when the note A is played on the violin (or piano, or any other instrument) what you actually hear is a chord. But because the harmonic linkage is so tight, and because the fundamental (110 in this case) is almost twice as loud as all of its overtones put together, we perceive the "A" as a single note, albeit a note with 'character.' This character - *or timbre* - is slightly different for each instrument, and that difference is what allows us to distinguish not only between types of instrument - clarinets from violins, for example - but also sometimes between individual instruments of the same type - a Stradivarius violin from a Guarneri.

This kind of *harmonic superimposure* has no practical limits to speak of. As long as the sounds are harmonically linked, you can superimpose as many elements as you want. Imagine an orchestra, with all the instruments playing octaves of the same note. Add an organ, playing more octaves. Then a chorus of 200, singing still more octaves. We are superimposing hundreds and hundreds of individual instruments and voices, but it will all still sound unified. If everyone started playing and singing whatever they felt like, however, that unity would immediately turn into chaos.

To give an example of non-musical harmonic superimposure: in *Apocalypse Now* we wanted to create the sound of a field of crickets for one of the beginning scenes (Willard alone in his hotel room at night), but for story reasons we wanted the crickets to have a hallucinatory degree of precision and focus. So rather than going out and simply recording a field of crickets, we decided to build the sound up layer by layer out of individually recorded crickets. We brought a few of them into our basement studio, recorded them one by one on a multitrack machine, and then kept adding track after track, recombining these tracks and then recording even more until we had finally many thousands of chirps superimposed. The end result sounded unified - *a field of crickets* - even though it had been built up out of many individual recordings, because the basic unit (the cricket's chirp) is so similar - each chirp sounds pretty much like the last. This was not music, but it would still qualify, in my mind, as an example of harmonic superimposure.

(Incidentally, you'll be happy to know that the crickets escaped and lived happily behind the walls of this basement studio for the next few years, chirping at the most inappropriate moments.)

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