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In the Studio: The Role of Recording Techniques in Rock Music (2006)

John Covach

I want this record to be perfect. Meticulously perfect. Steely Dan-perfect.
—Dave Grohl, commencing work on the Foo Fighters 2002 record *One by One*

When we speak of popular music, we should speak not of songs but rather, of recordings, which are created in the studio by musicians, engineers and producers who aim not only to capture good performances, but more, to create aesthetic objects. (Zak 2001, xvi-xvii) In this "interlude" Jon Covach, Professor of Music at the Eastman School of Music, provides a clear introduction to the basic elements of recorded sound: *ambience*, which includes reverb and echo; *equalization;* and *stereo placement.* He also describes a particularly useful means of visualizing and analyzing recordings. The student might begin by becoming sensitive to the three dimensions of height (frequency range), width (stereo placement) and depth (ambience), and from there go on to consider other special effects. One way to analyze the music, then, is to work backward from the final product, to listen carefully and imagine how it was created by the engineer and producer. To illustrate this process, Covach provides analyses of two songs created by famous producers in different eras: Steely Dan's "Josie" and Phil Spector's "Da Doo Ron Ron."

Records, tapes, and CDs are central to the history of rock music, and since the mid 1990s, digital downloading and file sharing have also become significant factors in how music gets from the artists to listeners. Live performance is also important, and some groups—such as the Grateful Dead, the Allman Brothers Band, and more recently Phish and Widespread Panic—have been more oriented toward performances that change from night to night than with authoritative versions of tunes that are produced in a recording studio. But even when fans exchange tapes of various live shows, what is changing hands is still a recording of some kind. Because of the importance of

recordings in rock music, some scholars argue that the rock repertoire is not simply a collection of songs, but that it is a collection of *specific recordings* of songs. There is, for instance, only one recording of *Sgt. Pepper's Lonely Hearts Club Band* that we value, and it's the one made by the Beatles in 1967. Who would prefer a copy of this album done by a group of sound-alikes? Further, different recordings have what might be thought of as "sonic signatures"—features that mark them in terms of where and when they were recorded, as well as by whom. Elvis's early recordings with Sam Phillips at Sun have a distinctive recorded sound that is, in a sense, separable from the songs themselves or the actual performances of them. For scholars with this view, rock is largely a recorded art, and thus, when we talk about rock songs, we are almost always also talking about rock *records*, even if we don't realize it.

This interlude will help you enter this important realm of recorded sound. It will provide an introductory glimpse into the recording process, describing the techniques and equipment used by engineers and producers in the recording studio and outlining some of their key concerns. We will then consider two contrasting tracks in detail, directing our attention to features of the music that will help us hear aspects of musical style imbedded in the way the recording itself has been made.

AMBIENCE

Is It Live or Is It Memorex? There are two principal ways of thinking about what a recording represents. The first is to think of the recording as an "audio snapshot." In this case, the recording is meant to reproduce a live performance as faithfully as can be done on tape (or digitally). As much as possible, the listener should be unaware that a recording process is involved: all of the sounds seem natural and almost indiscernible from an actual performance. This approach to recording is frequently used in classical, jazz, and folk music. The second way of approaching recording is to exploit the possibilities offered by the studio—an approach that produces sounds that would be impossible to recreate in the same way in a live setting. The records of Les Paul and Mary Ford are a good early example of this second approach: by progressively building up tracks of Paul's guitar and Ford's voice, Paul was able to create a recorded sound that was very much a consequence of the recording technology that produced it. The recording studio allows instruments to be combined in ways that would not easily work in a natural acoustic setting; one of the most common of these is putting an acoustic guitar together with drums and distorted electric guitar, as heard on a myriad of tracks, including Boston's "More Than a Feeling." The fact that live performance technology since the early 1970s has made it increasingly possible to combine acoustic instruments with louder electric ones is in large part a result of sounds that occurred first in the studio. Since the days of Elvis Presley's Sun recordings, rock music has depended more on this second approach to recording—exploiting the possibilities of the studio—than it has on the audio snapshot approach. Other styles, such as classical and jazz, remain devoted to the first approach.

Reverb and Echo. Whether we are aware of it or not, every space we enter has specific acoustic properties. Whenever a sound is made, it is the result of a series of vibrations moving through the air; some of these vibrations reach our ears directly from the source while others bounce around the room and reflect back to us. Hard surfaces reflect sound; more porous ones (like carpeting, curtains, or furniture) absorb sound. Architects who design concert halls are keenly aware of this, and they devote considerable energy to determining the balance of harder and softer surfaces in a hall and how these surfaces will be angled. The idea, of course, is to create a space that makes the performances in the hall sound as acoustically rich as possible. If there's too much reflection, the sound can be too bright or boomy; if there's not enough, the music can sound dry and lifeless. When recording according to the audio snapshot approach, it is crucial to find a space with "good acoustics"—that is, with the right kind of reflected sound for the ensemble or soloist involved. Major record companies have in the past maintained their own studios, some bigger and some smaller, that have been acoustically engineered for the best natural sound. For them, the task is not only to capture the way the musicians sound but also to commit to tape how those musicians sound in that specific room. In rock music, stories abound of vocals that were recorded in bathrooms, or guitar parts that were recorded in hallways or stairwells in order to take advantage of the natural acoustics of those spaces. It is also possible to create a room sound—often referred to as "ambience"—via electronic means, and this effect is called "reverb." Most commercially available electronic reverb units offer settings that reproduce the sound of small rooms, medium-size rooms, large rooms, auditoriums of various sizes, and churches, as well as a number of "unnatural" spaces. When an engineer knows that she will use reverb, she records the sound as "dry" as possible, meaning an acoustic space is used that reflects little sound (these spaces often use special sound-absorbing material). This dry sound is then fed through the reverb device to produce the desired sound. Reverb is used to some extent on almost all rock recordings, meaning that the "spaces" captured on tape are often not real spaces at all. In addition, different kinds of reverb can be used on different instruments or voices, producing sounds that are the result of multiple "spaces," none of which could naturally coexist in a world with only three dimensions.

Reverb must be distinguished from echo. In the natural world, an echo occurs when sound bounces back to our ears to create two sonic images of the same event—we hear the original and then its reflection. This sound can be produced electronically as well, though some recording studios have built their own trademark "echo chambers" (the chamber at Gold Star Studios in Los Angeles—now destroyed—has almost mythical standing within the recording world). Echo tends not to be of much concern to those who employ the audio snapshot approach; mostly they try to avoid it. In rock, echo is used extensively and often on voices. Together with reverb, echo can make the singing voice sound much richer and even mask certain imperfections in tone or intonation. The beginning of the Supremes' "Where Did Our Love Go?" is a good example of studio reverb. The clapping (actually two-by-fours being slapped together) is drenched in a rich reverb that makes it sound like the clapping is occurring in a large gymnasium or some other big, reflective space. The most famous echo can be found on Elvis Presley's Sun recordings. For many years after Elvis's success, studio engineers all around the world tried to reproduce the distinctive echo found on songs such as "That's All Right (Mama)," in which the quick echo (often called "slap-back echo") gives Presley's voice a quality that he could

never have produced live. Reverb and echo provide what might be thought of as the ambient dimension of the music, and the use of these effects can make instruments sound closer to or farther from the listener, depending on how much reverb or echo is employed—the more reverb or echo, the farther away the sound seems to be.

EQ, STEREO, AND MIXING

River Deep, Mountain High: EQ. If we think in terms of three dimensions, ambience (along with volume level) accounts for the "depth" of a recording. Things sound nearer or farther away based on how loud they are and how much reverb or echo is present. The "height" of a recording is its frequency range. In traditional terms, musicians think of frequency range in terms of the available pitch range of various instruments; thus, a flute or violin is relatively high in the frequency range compared to a double bass, trombone, or tuba. A piano or organ has a wide range, extending from the lowest to the highest note possible by other instruments. The most common classical ensembles, from orchestra to string quartet, encompass a broad frequency range by virtue of the instruments included, and composers who write for these groups attend constantly to the balance of sounding pitches in the low, middle, and high ranges. Rock also brings together combinations of instruments that fill out the frequency range; bass covers the low end, while guitars, keyboards, and voices fill out the middle and upper ranges. The actual note played by an instrument is called its "fundamental"; but along with this note, every instrument also subtly produces other, higher notes that are heard not as harmony notes, but rather as the tone, or "timbre" (pronounced to rhyme with "amber") of the instrument. You have probably noticed that if you adjust the treble and bass settings on your stereo you can greatly affect the sound—more treble and the sound is brighter, less treble and it sounds muffled. These tone settings adjust the volume of the frequencies in the sounds you hear and affect not only the fundamentals but also the higher notes that are generated in each case (called "upper partials" or "harmonics"). In the process of recording instruments, an engineer has a significant amount of control over the timbre of each recorded sound; for each microphone in use he has four or more controls that work like the treble and bass on your stereo. In addition to being concerned that the frequency range for any given track is balanced with regard to the fundamental notes being produced by the instruments and voices involved, the engineer can also balance the sound by adjusting the timbre of each. This area of concern is usually referred to as "EQ," which is short for equalization. A good recording is "EQ-ed" to produce a balanced distribution of frequencies. EQ can also help to bring out certain instruments, as well as to keep instruments in a similar range from covering each other up, resulting in a crisper, clearer, and more defined sound.

Every Breadth You Take: Stereo Placement. The third dimension of recorded sound, the "width" of the music, is stereo placement. When we hear sounds in the natural world, we can locate the position of a sound source because the sound enters each of our ears in a different way. Our mind calculates where a sound is coming from on the basis of the "stereo" effect. In music that is recorded in stereo, the engineer can control whether a sound comes out of the right or left speaker, or some combination of the two. In order to hear this clearly, sit exactly between your stereo speakers. Put on a stereo recording and close your eyes: you will notice that there is a kind of "sonic landscape" in the space between the two speakers. Some sounds seem to come from the center, while others seem to come from the right or left, or mid-right or mid-left. It is, of course, impossible for the sounds that seem to be coming from the center to really be coming from there; after all, you are sitting between the speakers and there is no center speaker physically present. Stereo sound is thus an aural illusion or image that we construct as a result of how we hear. Engineers use this phenomenon to separate sounds from one another to allow us to hear more detail in the recording. For instance, if a rhythm guitar and organ are playing almost the same thing in the same frequency range, the listener may not be able to distinguish them from one another—one will cover up or "mask" the other. If you adjust one to sound like it is coming from the right ("pan right") and the other from the left, each will be much more distinct. So, in a stereo recording, the instruments and voices are arranged across the stereo field and the result is that the recording sounds clearer and more complex sonically.

The three dimensions of the recorded sound—ambience/volume, EQ, and stereo placement—are controlled from a mixing board. A mixing board is used in two ways: first, to record the sound to tape (or more recently to the hard disk of a digital recorder) and second, to play the tape back. In classical music, the engineer's job is to capture the sound in the natural ambient space as faithfully as possible; a playback will not color the sound much more (though it may, and sometimes adjustments are made at this second stage). In rock, sounds are often committed to tape dry (except when special room effects are desired) and stored for playback. Early recording tape could store three tracks of music (meaning that the three tracks could be played back simultaneously), but as the '60s and '70s progressed, tapes could contain eight, sixteen, twenty-four, thirty-two, forty-eight, and even more tracks. With the advance of digital technology in recent years, the number of tracks available is so large that track space is no longer a technical limitation. Once all the tracks are stored on tape, the engineer is then ready to "mix down," meaning that she will adjust the ambience, EQ, stereo placement, and relative volume of the tracks to produce the final version of the song. (Notice that the word "track" is used in recording to specifically designate a recorded part, but it is also used more generally among fans and writers to mean "song" or "tune," as in "Let's hear the second track on that CD.") Mixing is a complicated and creative process, and engineers and producers who do this are highly skilled professionals, often known for their distinctive "sound." Since the mid 1960s, bands have frequently spent more time mixing an album than they spent recording the individual tracks.

MONO AND STEREO

For its first decade or so, most rock music was recorded and released in monophonic sound (or "mono"), meaning that there was assumed to be only one speaker for playback and thus no possibility of stereo imaging. Almost all of the Beatles' records, for instance, were released principally in mono, with later stereo versions being prepared mostly (and sometimes hastily) for hi-fi enthusiasts, often without the band participating in the

stereo mixes. By the late 1960s, however, stereo was the preferred format for albums and FM radio, and by the mid 1970s complex stereo mixes had become the norm even for music that nurtured an image of simplicity and directness. The development of more and more tracks, the greater use of the stereo field, and increasingly ambitious musical projects progressed hand-in-hand throughout the late '60s and '70s, as listeners purchased more and more sophisticated stereo equipment to get the full effect of the music. Among the most successful of the producers to work in mono was Phil Spector, and some of the most sophisticated recorded sounds in stereo came from Steely Dan. Spector and Steely Dan will thus make for a good comparison as representatives of mono and stereo, respectively. But since most of the rock music we listen to is in stereo, we'll begin our detailed listening there.

LISTENING GUIDE

Steely Dan, "Josie"

Words and music by Walter Becker and Donald Fagen, produced by Gary Katz. Reached #26 on the Billboard Pop charts in 1978. Contained on the album *Aja*, which reached #3 in the United States and #5 in the UK in late 1977.

FORM: Compound AABA form, with A sections employing a verse-chorus pair.

TIME SIGNATURE: 4/4.

	0:00–0:32	**Introduction,** 16 mm.	8 mm. guitar figure then 8 mm. vamp.
A	0:32–1:03	**Verse 1,** 16 mm.	"We're gonna break out . . ."
	1:03–1:28	**Chorus,** 12 mm.	8 mm. chorus then 4 mm. link to verse 2.
A	1:28–1:59	**Verse 2,** 16 mm.	As before, "Jo would you love . . ."
	1:59–2:15	**Chorus,** 8 mm.	No link this time, "When Josie . . ."
B	2:15–2:31	**Bridge,** 8 mm.	Instrumental.
A	2:31–3:03	**Instr. verse,** 16 mm.	Guitar solo.
	3:03–3:19	**Chorus,** 8 mm.	As second chorus, "When Josie . . ."
	3:19–4:24	**Coda,** 32 mm.	8 mm. as intro, then 24 mm. vamp and fade.

INSTRUMENTATION

Rhythm Section	*Singing*	*Solos*	*Sweetening*
Electric piano	Solo w/some harmony on verse and chorus	Electric guitar	Horns
2 rhythm guitars			Synth strings
"Funky" guitar			Percussion
Drum set			
Bass			

MIX

Left		*Center*		*Right*
Cymbal	Solo guitar	Lead vocal	Backup vocals	High-hat
Rythm guitar	Backup vocals	Electric piano	Horns	Cymbal
Tom-tom	Horns	Percussion		"Funky" guitar
Synth strings		Snare drum		Rhythm guitar
		Bass		Tom-tom
		Bass drum		

Steely Dan's "Josie" is structured according to the compound AABA form found so often in 1970s music. After an angular introduction featuring the electric guitar, there are several measures of vamp before the first verse begins. There are then two verse-chorus pairs making up the large-scale A sections, followed by an instrumental bridge making up the B section. The return to the verse-chorus pair in this case features a guitar solo over the verse material, with the vocals returning for the chorus. A return to the introduction and vamp close the song, as it fades out. In terms of the instrumentation, the track uses a fairly standard rhythm section of rhythm guitars, electric piano, bass, and drums. The vocals are mostly solo, with some harmony added during both the verse and chorus sections. Horns, percussion, and synthesizer strings are added to sweeten the mix. The stereo aspect of the record can be heard most readily in the drums: note that while the snare and bass drums are in the center, the high-hat is panned right, while tom-toms and cymbals are panned both right and left. As is usual for most rock, the lead vocals and bass are in the center. Three electric guitars are involved in the rhythm section: two of these are panned right and left and play an almost identical part with piano, which is panned center. There is a third guitar, which plays a funky single-note part, panned right. When the synthesizer strings enter in the second chorus, they are panned left. Note that the horns and backup vocals are both panned mid-right and mid-left to keep them distinct in the mix. Listen for the reverb and echo that have been added to the lead vocals and the heavy reverb on the synthesizer strings and solo guitar; by contrast, the bass, bass drum, and high-hat are very dry. Thus, in addition to the separation that occurs through stereo placement, ambience is also used to help keep the parts distinct. The distribution of instruments and equalization across the full frequency range makes the recording sound full, with plenty of low end balanced by bright highs.

Phil Spector is known for his Wall of Sound approach to production, and his recordings from the early 1960s sound very different from Steely Dan's "Josie." While the ambience, stereo placement, and EQ in the Steely Dan track were all employed to make each part aurally distinguishable in the mix, Spector's Wall of Sound technique strives to achieve the exact opposite effect. Spector worked to blend the backup instruments together in such a way that they melt into one another aurally. This was done by recording most of the backup music with all the musicians together in the same studio. With drums, piano, guitar, and bass (plus

whatever else Spector had playing) all together in a small space, the sound from the guitar ended up in the piano microphone and the drums bled through the guitar mic, and so on. The result produces a different imaging from sounds in the Steely Dan tune. Since Spector's recordings are in mono, there is no breadth through stereo placement. Instead, there is a foreground space for the lead vocal and a background space for everything else (though the backup vocals are farther forward in the background space than the instrumental parts). Notice in "Da Doo Ron Ron" that the lead vocal is enhanced by double tracking; the singer, Darlene Love, likely recorded the vocal and then recorded it again along with herself, giving the lead voice an added richness. There seems to be reverb on everything in this recording, even the drums, producing some cavernous tom-tom fills. Since Spector was working with only a few tracks available, most of the EQ-ing was likely done during the recording stage as opposed to being done at playback. The instruments sometimes blend together so completely in a Spector recording that it can be difficult to discern exactly what instruments are present; can you detect a guitar in the rhythm section of "Da Doo Ron Ron," for instance?

LISTENING GUIDE

The Crystals, "Da Doo Ron Ron"

Words and music by Phil Spector, Jeff Barry, and Ellie Greenwich, produced by Phil Spector. Reached #3 on the Billboard Pop charts in 1963 (UK5).

FORM: Simple verse, with an instrumental verse that is a shortened version of the sung ones.

TIME SIGNATURE: 12/8 (shuffle in four)

0:00–0:06	**Introduction,** 4 mm.	
0:06–0:35	**Verse 1,** 18 mm.	16 mm. verse plus 2 mm. link, "I met her . . ."
0:35–1:04	**Verse 2,** 18 mm.	Same as above, "I knew what she . . ."
1:04–1:17	**Instr verse,** 8 mm.	Sax solo using first 8 mm. of verse.
1:17–1:46	**Verse 3,** 18 mm.	As verses 1 and 2, "Well, I picked her up . . ."
1:46–2:11	**Coda,** 16 mm.	Repetition of first 4 mm. of verse and fade.

INSTRUMENTATION

Rhythm section	*Singing*	*Solos*	*Sweetening*
Piano	Solo, with	Saxophone	Horns
Guitar?	Echoes and		Percussion
Drums	Harmony		Hand claps
Bass			

MIX

Foreground	*Background*
Solo vocal, sax solo	Backup vocals
	Horns
	Rhythm section
	Percussion
	Hand claps

This brief consideration of recording technique barely scratches the surface of the complexities of recorded rock music. Most listeners never realize that the sounds they are hearing are so heavily mediated by electronic means. They may even believe—however tacitly—that most records are "audio snapshots," representing performances that occurred in real time just as a live performance would. In order to hear the subtle features of recordings, it is useful to listen to the same song many times, maybe once or twice each for stereo placement, instrumentation, ambience/volume, and frequency distribution. Once you have heard deeply into a single recording, you may be surprised at what you begin hearing in records you have known for years.

FURTHER READING

Mark Cunningham, *Good Vibrations: A History of Record Production* (Sanctuary, 1996).
Howard Massey, *Behind the Glass: Top Record Producers Tell How They Craft the Hits* (Backbeat Books, 2000).
Albin Zak III, *The Poetics of Rock: Cutting Tracks, Making Records* (University of California Press, 2001).

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The Fuzz (1999)

Michael Hicks

There was no point in trying to learn from him. You couldn't tell how he was doing it. It was like magic.

—Lemmy Kilmister of Motörhead remembering his year as roadie for Jimi Hendrix, whom he watched every night. (*Rolling Stone* 1090 (October 29, 2009): 64)

A characteristic element of rock's sound is the fuzz or distortion of an electric guitar. Michael Hick's history of fuzz suggests that this has been a basic part of the sound of rock from the very beginning. The reasons for this are aesthetic, technological and accidental. To begin with, horn players and, later, guitar players imitated the vocal "roar" of blues and gospel singers and revivalist preachers, a sound that conveyed raw power. The technologies of radio, vinyl records, and weak amplifiers added further noise to the sound of early electric blues and rock 'n' roll, as did accidental or deliberate speaker damage. Musicians could not afford to wreck their amplifiers to get such a sound, and so the fuzz box was developed around 1962. As Hicks, Professor of Music at Brigham Young University, notes, the guitar then went on to develop multiple personalities with a variety of special-effects pedals. Among the most influential fuzz guitar songs Hicks names are "Rocket 88" by Jackie Brenston (1951), "Rumble" by Link Wray (1958), "Zipp A Dee Doo Dah" by Bobb B. Soxx and the Blue Jeans (1962), "You Really Got Me" by the Kinks (1964), and "(I Can't Get No) Satisfaction" by the Rolling Stones (1965).

Just as rock singers refracted their voices into multiple personalities, rock guitarists transformed their instruments into surrogate singers. Aided by new technologies, rock guitarists exchanged the instrument's historically slight musical presence (with delicate timbres, low dynamics, and rapid decay) for a new, overwhelming presence (with rough timbres, loud dynamics, and the ability to sustain—or, as Paul McCartney puts it, to "flow").[1] At the center of the exchange was a warm, powerful, sonorous sizzle known as "fuzz."

[1]Quoted in "Distortion Tips from the Loud & Mighty," *Guitar Player* 26 (October 1992): 45.

Fuzz grew inevitably from the peculiar sonic world of mid-twentieth century popular music. In the 1920s and 1930s brass players in Duke Ellington's band popularized the "growl and plunger" style of playing, a raucous mimicking of the vocal roar. By humming, flutter-tonguing, or literally growling while playing, players like Bubber Miley and Cootie Williams got tones that sounded like a controlled, distorted scream.[2] In rhythm and blues music of the 1940s and 1950s (and Motown and Memphis soul recordings of the 1960s) saxophone players routinely emulated the trumpet growls of those earlier players; by combining various hard mouthpieces and stiff reeds, by blowing with extra force, and using the techniques of Miley, Williams et al., tenor and baritone saxophone players could make the already noisy timbre of their instruments sound even more ragged.[3] Such effects allowed a player to transcend conventional virtuosity—as measured in notes per measure—in favor of a more primal, direct expression. This so-called "boot" style of tenor saxophone playing offended many purists. One complained that through it "a player of very little improvisational talent can achieve instant success with the mob by playing three or four successive choruses on one note. Provided, of course, that he heightens the impression of inspirational fervour by blowing himself blue in the face and marking time like an epileptic sergeant major."[4] Despite such cynicism, the boot style prevailed.

Although boot style began by imitating the roar and buzz of rhythm and blues singers, saxes and voices gradually achieved a symbiosis. The techniques of each reinforced the other—as Screamin' Jay Hawkins explained, his ambition was to make his voice "duplicate the sounds I got off a tenor sax."[5] But sax playing required immense physical effort, as did the roar and buzz of the singers. In all cases the sound was terse and forced, as though great strength and resistance were required to give them utterance—and they were. During the early years of rock 'n' roll, vocal and saxophonal distortion complicated the sonorous edge of the music—an edge reinforced by the sizzle of ride cymbals, snare drums, and, occasionally, maracas.

That complex of distorted sound complemented the technological basis of the rock 'n' roll industry. Most people learned rock 'n' roll through the radio, where signals competed with one another for dominance of a particular wave band. The music often came through a sieve of white noise and electrical hum that made almost any instrument or voice seem to buzz. (This was especially true of the earliest rock 'n' roll, which first appeared on some of the weakest, most remote stations.) And the records that were broadcast had their own distortion. Not only was the music typically

[2]See, for example, the Ellington Band's 1927 recording of "East St. Louis Toodle-oo." My thanks to Brian Harker for providing me with recordings of this phenomenon. See also Barry Kernfeld, ed., *The New Grove Dictionary of Jazz* (New York, Macmillan, 1988), s.v. "Growl."

[3]Examples abound: some of the best are the buzzing baritone sax opening of Chuck Higgins's "Pachuko Hop" (1953), the playing of Joe Tillman in Lloyd Lambert's "Whistlin' Joe" (1955), and the two-note saxophone bass line in Little Anthony and the Imperials "I'm Alright" (1958).

[4]Humphrey Lyttelton, *New Musical Express*, quoted in Charlie Gillett, *The Sound of the City: The Rise of Rock and Roll*, rev. 2d ed. (New York: Pantheon, 1983), 258.

[5]Quoted in Karen Schoemer, "Screamin' Jay Hawkins as Pitchman and Actor," *New York Times*, 5 April 1991, sec. C, 15.

recorded at high levels on hissing tapes, but repeated playings wore out the vinyl and made the music even fuzzier. As the predominant media of rock 'n' roll, broadcasting and recordings turned what was once an undesirable flaw into the essence of the sound. That essence signified raw power, survivability in the face of interference.

In the early twentieth century dance bands began to include guitars with brass and saxophones, a situation that created a serious imbalance of sonority: the guitar was essentially a quiet instrument, the saxophone a loud one. So in the 1920s manufacturers experimented with guitar "pickups," magnetic coils that could vibrate sympathetically with the instrument's strings. In 1931 Rickenbacker issued the first commercial electric guitar, a lap-held Hawaiian model resembling a long-handled frying pan. Later in the decade, the National and Gibson companies devised more conventionally shaped electric guitars. Meanwhile, some players began to make their own electrics by installing pickups in their acoustic (i.e., non-electric) guitars. Finally, Les Paul and Leo Fender dispensed with the guitar's resonating cavity entirely, building the first solid-body electric guitars in the late 1940s and early 1950s. With their new designs (and more refined pickups) both makers hoped to increase the instrument's tonal "purity," reducing the hum and buzz of older electrics. In the process, they redefined the electric guitar by demonstrating to the public what electrical engineers had long known: the strings of an electric guitar provoked electrical impulses directly.

Trying to keep their prices competitive, makers of electric guitar amplifiers used low-cost "P.A. grade" transformers in their equipment. At normal volume levels these transformers distorted the signal about 5 percent. But when pushed beyond their capacity—"overdriven"—the distortion levels rose to around 50 percent.[6] Black rhythm and blues guitarists usually could afford only the smallest, least powerful amps. At the same time they had to play in some of the noisiest venues. Although evidence is scarce, Robert Palmer quite plausibly suggests that bluesmen such as Muddy Waters were forced to overdrive their weak amplifiers "just to cut through the din."[7] But at some point, probably in the late 1940s, the bluesmen discovered that, by turning their amplifiers up louder than they were designed to be, they could make the guitar's timbre resemble the raunchy, distorted timbre of boot saxophone playing.

Many of the records made at Chess Studios in Chicago in the late 1940s and early 1950s captured the sound. In Howlin' Wolf's "All Night Boogie" (1953), for example, Willie Johnson's overdriven electric guitar dovetails with a similarly overdriven miked harmonica and Wolf's own "overdriven" voice to paint a perfectly consistent timbral painting. (Sun Studios in Memphis harnessed a similar sound, particularly in the guitar playing of Pat Hare.) In such cases the capturing of live distortion on records required careful engineering, since the studios wanted to faithfully document the distorted sound of the *guitars*, rather than distort the *recording* by overdriving the microphones. Whether the listener would have discerned the difference is hard to say.

[6]The overdriving of the amplifier created, in effect, a band-pass filter that clipped the original signal's wave-form into something close to a square wave, full of high-amplitude overtones.

[7]Robert Palmer, "The Church of the Sonic Guitar," *Southern Atlantic Quarterly* 90 (Fall 1991): 656.

Writers generally point to Guitar Slim as the electric guitarist who played the loudest, most distorted blues of the early 1950s. Playing through the P.A. system (rather than through a separate guitar amplifier), Slim always kept his guitar at maximum volume—with the club doors open to attract customers.[8] His maniacally distorted sound became legendary, not only through his performances but also through recordings like his hit "The Story of My Life" (1954), in which the guitar solo, rather than the vocal—perhaps for the first time on a rhythm and blues record—seemed the real point of the song.[9]

Like electric blues players, rock 'n' roll guitarists almost inevitably overdrove their amplifiers, trying to project their music above the sound of drums and talkative audiences. Chris Dreja of the Yardbirds assessed the situation of many groups and their early stage equipment: "God, it was basic. Between the five of us we must have had all of twenty watts. It was so quiet I could hear myself hitting the strings of my electric guitar."[10] Nevertheless, upon hearing such groups in England in 1962, Muddy Waters remarked, "Those boys were playing louder than we ever played."[11]

If overdrive was almost inevitable, some kinds of distortion were not. In many cases, accidental (and later, deliberate) damage to amplifiers enhanced the fuzzy sound. As early rock 'n' roll groups toured from club to club, the frequent moving made it likely that the cardboard cones of the speakers might be torn, or tubes damaged. In most such cases a band would simply replace the damaged part or, if times were good, buy a new amplifier. In March 1951, however, Willie Kizart tore the woofer cone of his amplifier while driving to a Jackie Brenston recording session at Sun Records in Memphis. There was neither time nor money to repair it. When the group arrived at the session with the broken speaker, producer Sam Phillips stuffed a newspaper and a sack into the hole and decided to record with the speaker as it was.[12] Tellingly, Phillips remarked, "It sounded good. It sounded like a saxophone." Phillips added that he wanted the "authentic" sound that the broken equipment gave the recording: "If they had broken-down equipment or their instruments were ragged. . . . I wanted them to go ahead and play the way they were used to playing. Because the *expression* was the thing."[13]

The result was a simple boogie record noteworthy only for the strange fuzzy sound of the guitar, which (like the saxophones in many New Orleans recordings) merely doubled the walking bass line, outlining the triads of the chord progression. Brenston and Phillips entitled it "Rocket 88," a tribute to the 1950 V-8 Oldsmobile 88, which was advertised as "the lowest priced car with 'rocket' engine."[14] While the tune was unimaginative, the novel guitar sound attracted many listeners.

[8]See John Broven, *Rhythm and Blues in New Orleans* (Gretna, La.: Pelican, 1988), 54.
[9]See the discussions of Slim's high-volume technique in Jas Obrecht, ed., *Blues Guitar: The Men Who Made the Music* (San Francisco: GPI Books, 1990), 134; also Palmer, "Church of the Sonic Guitar," 663-66.
[10]John Platt et al., *Yardbirds* (London: Sidgwick and Jackson, 1983), 23.
[11]Quoted in Palmer, *Rock & Roll*, 115.
[12]Elizabeth Kaye, "The Rolling Stone Interview: Sam Phillips," *Rolling Stone* 467 (13 February 1986): 85.
[13]Sam Phillips, quoted in Robert Palmer, *Deep Blues* (New York: Viking, 1981), 222.
[14]For this and other background to the recording, see Jim Dawson and Steve Propes, *What Was the First Rock 'n' Roll Record?* (Boston: Faber, 1992), 88-91.

Five years later, another amplifier accident reshaped the sound of Johnny Burnette's Rock 'n' Roll Trio. Guitarist Paul Burlison recalls that the strap of his Fender Deluxe amplifier broke before a show in Philadelphia, dropping the amp on the floor. "When we started playing, it sounded fuzzy, but it wasn't enough to stop the show. So Johnny looked around and grinned and we just kept on playing. When I got back to the dressing room I took the back off the amp and looked at it, and what had happened was one tube had slipped about halfway out. So I pushed the tube back up and it worked fine; pushed it back down and it'd get fuzzy."[15] Burlison's accident had not produced permanent damage, as Willie Kizart's had. Instead, the loose tube had shown him a method of tone production that was controllable (i.e., it functioned as a rheostat). It was an effect that could be switched on and off, irrespective of volume or speaker quality. In that regard, it directly foreshadowed the fuzz "controls" of the early 1960s, by which players could turn the distortion on and off with a switch.

Burlison decided to use the fuzzy guitar sound on the group's 2 July 1956 recording session for two songs, "Blues Stay Away from Me" and "Train Kept A-Rollin'." The distortion was barely noticeable in the former song, but in the latter it was prominent. As with "Rocket 88," the distorted guitar was the record's principal novelty. As "Train Kept A-Rollin'" became widely known, according to Burlison, "I had engineers calling me from all over the country asking how I got that sound."[16] Despite the interest, Burlison exploited the sound in only one subsequent recording—the calypso-based "Touch Me" (recorded March 1957).

The role of the distorted guitar in "Blues Stay Away from Me" and "Touch Me" resembled its role in "Rocket 88": it was an interesting coloration of standard guitar ostinati. It outlined the chord, provided some contrapuntal interest, and articulated the beat. But in "Train Kept A-Rollin'" Burlison uses the guitar primarily to make loud low-register plunking sounds, effectively turning it into a powerful percussion instrument. The rapid reiterations create texture and sonority for their own sake, without a conventionally functional harmonic, melodic, or bass-foundational role. Dominating the other elements of the recording, the fuzz guitar seems to emulate the chugging of a train at full speed.

Still one more accident produced another legendary distorted guitar solo. In Bobb B. Soxx and the Blue Jeans' "Zip A Dee Doo Dah" (1962), Billy Strange's electric guitar part leaked into some of the live mikes around the studio, creating a strange, growling sound. Producer Phil Spector thought it a flaw, but left it in. As engineer Larry Levine explained, Spector "didn't care what the break was gonna sound like. We played a full chorus before we got to the break, and you don't sell a song with a solo on a break."[17] But he did not envision how important a voice the lead guitar was coming to be. Described by one writer as a "tinny coil of disembodied noise," Strange's guitar break became the record's most important contribution to rock—the first Top 10 fuzz guitar solo.

[15]Burlison quoted in Dan Forte, "The Pioneers of Rock Guitar," *Musician, Player & Listener* 43 (May 1982): 33.
[16]Quoted in Forte, "Pioneers of Rock Guitar," 33.
[17]This quote and the following one are from Mark Ribowsky, *He's a Rebel* (New York: Dutton, 1989), 126–27.

In the late 1950s some electric guitarists began to damage their equipment deliberately in order to create fuzz. This happened mainly among *instrumental* rock 'n' roll bands, who continued the tradition of the rhythm and blues dance bands of the 1950s. Early rock 'n' roll instrumental bands featured saxophone, but in the late 1950s guitars took over. Without words or a lead vocalist, instrumental hits often used gimmicks and sound effects to make them memorable.

In 1958 guitarist Link Wray drove a pencil through the speaker of his amplifier before recording a new instrumental record. According to rock lore, he damaged the speaker specifically so that the guitar sound would better represent the aggressive sound of a gang brawl—a "rumble." (The truth, however, is probably that the damage came first and the record's title, "Rumble," came later. The daughter of the owner of Wray's record label said that the untitled recording reminded her of the rumble scenes in *West Side Story*, then a Broadway play. Hence the title.)[18] "Rumble" is a slow, twelve-bar (sometimes eleven-bar) blues, in which the guitar primarily plays slow, clanging chords.[19] Given its relatively innocuous harmonic and rhythmic content, "Rumble" clearly demonstrates how one could produce a Top-20 hit with little else but the sheer sonority of fuzz. Wray tried (unsuccessfully) to duplicate the success of his first fuzz record in recordings that include "Raw-Hide" (1959), "Big City after Dark" (1962), "Black Widow" (1963), and "Deuces Wild" (1964).

But Wray did inspire many guitarists of the early 1960s to follow his example. Larry Parypa of the Sonics, for instance, "was always fooling around with the amps . . . . disconnecting the speakers and poking a hole in them with an icepick."[20] Deep Purple's Ritchie Blackmore claims to have kicked in a speaker (ca. 1960) in order to create a fuzz effect.[21] Around 1963 Dave Davies of the Kinks took the 8-inch speaker of a 4-watt amplifier and "proceeded to cut [it] into ribbons with a razor blade. Then I patched it up with Sellotape and stuck a few drawing pins into it." He set this on top of his 30-watt amp, keeping the smaller one at full volume and the bigger one as low as possible.[22]

With this arrangement the Kinks produced their initial hits "You Really Got Me" and "All Day and All of the Night" (1964), which together codified the technique of "power chords"—overdriven barre chords that were given a terse, grunting quality by relaxing the left hand just enough after each strum of the right so that the ringing of the strings would be stopped. This was the guitar equivalent of the stopped articulation of raucous soul saxophone players, except that it now applied to whole harmonies.

While many guitarists wanted at least an occasional fuzz effect, few could afford to wreck their amplifiers to get it. One alternative was the recording studio: guitarists could distort their sound by recording with the input levels in the red—even if their

[18]According to Duane Eddy, Phil Everly actually came up with the title after producer Archie Bleyer played him the finished recording. See Wayne Jancik, "The Definitive Duane Eddy Interview," *Discoveries* 71 (April 1994): 21.

[19]At the third cycle of the blues progression, however, Wray introduces a rapid-strummed tremolo. When it ceases, the *electronic* tremolo gradually takes over.

[20]Quoted in Notes to *Here Are the Ultimate Sonics* (Etiquette ETCD 024027).

[21]Jas Obrecht, "Effects on Records: Pioneers and Prime Movers," *Guitar Player* 17 (June 1983): 26-28.

[22]Jon Savage, *The Kinks: The Official Biography* (London: Faber, 1984), 32.

own amplifiers sounded clean. But this still left the problem of playing fuzz in concert. The solution came from the so-called "fuzz box," a small accessory to a guitar amplifier that severely "clipped" the peaks of the instrument's natural wave form.

While most of the documentation on early fuzz boxes has been discarded or lost, the earliest such devices appear to have been introduced in 1962. The best known from that year was the Maestro Fuzztone FZ-1, a triangular brown footswitch that resembled a door stop. It allowed guitarists to control not only the tone of the instrument (i.e., treble and bass), but also the amount of distortion. Unsure of how to market such a device, the Gibson company (a distributor for Maestro) told prospective buyers that the Fuzztone would make a guitar sound like a cello![23]

The Ventures—the most popular rock 'n' roll instrumental band—probably used the Maestro device in "The 2,000 Pound Bee," parts 1 and 2, recorded in October 1962. In part 1 of this track the group plays a modified twelve-bar blues, with a single riff transposed to the level of each of the harmonies; part 2 differs only slightly. Nothing distinguishes this novelty record except for the fuzzy guitar that plays the melody. Although "2,000 Pound Bee" sold relatively poorly (only the B-side made the charts—Number 91), the Ventures continued using the fuzz box on other records. In their *Surfing with the Ventures* album (1963) they use some degree of overt distortion on nine of the twelve tracks—sometimes in accompanimental patterns, but usually in the lead melody (most prominently in the track "Barefoot Ventures"). Two subsequent singles—"Journey" to the Stars" (1964) and "Pedal Pusher" (1965)—use heavy fuzz. But both failed to chart.

The "2,000 Pound Bee," however, had caught the attention of three British guitarists and a young technician who lived near them. In 1963 seventeen-year-old Roger Mayer began working for the British Admiralty as an assistant experimental officer in sound and vibration analysis. While evaluating types of distortion for his job, Mayer tried to emulate and improve upon the Ventures' fuzz guitar sounds. Making fuzz boxes soon became his hobby. He gave some of them to his friends Eric Clapton and Jimmy Page, the latter of whom passed along a fuzz box to Jeff Beck. Other guitarists also took interest in the boxes. One, Jim Sullivan, became the first to use a Mayer fuzz box on a record—P. J. Proby's minor hit "Hold Me" (1964).[24]

Jeff Beck joined the Yardbirds and used a Mayer fuzz box on one of his first recordings with the group. The three-pitch lead guitar riff of "Heart Full of Soul" (recorded February 1965) had originally been conceived for a sitar, and producer Giorgio Gomelsky hired two sitarists to play the riff at the recording session. But despite the exotic timbre, the delicacy of their sound and their rapid decay prevented the sitars from carrying the idea effectively. Beck suggested that with his fuzz box he

[23]My dating of this device comes from telephone conversations with Walter Carter and J. T. Riboloff (both at Gibson Incorporated), 7 August 1995, and the comments of Roger Mayer in John Seabury and Charles Shaar Murray, "In Search of Volume: Guitar Amplification in the '60s," in Paul Trynka, ed., *The Electric Guitar: An Illustrated History* (San Francisco: Chronicle Books, 1995): 85.

[24]The information in this paragraph comes primarily from Jas Obrecht and Bruce Bergman, "Roger Mayer: Electronics Wizard," *Guitar Player* 13 (February 1979): 47.

could get an overtone-rich sound similar to that of the sitars, but with more volume and less decay. His version prevailed.[25]

The Rolling Stones forcefully brought the fuzz box to public attention in their hit "(I Can't Get No) Satisfaction." Keith Richards recalls that his own three-pitch guitar riff for the song was "actually a horn [i.e., saxophone] riff," one that was "in essence not meant for the guitar." Richards used no fuzz for the riff in the first several takes of the song (made in spring 1965). But, as he explained, "that riff needed to sustain itself."[26] A fuzz box provided the solution. Although Richards always considered the fuzz sound on "Satisfaction" a "bit of a gimmick," it generates much of the song's expressive power.[27] As David Dalton put it, the distorted riff "balances neatly on the borderline of menace, arrogance and incitement"—traits that entwine with the lyrics and Jagger's delivery.[28]

The music of "Satisfaction" oscillates between the two basic sonorities introduced in its opening. One is the grainy, medium-pitched buzzing and jangling blend of tambourine, snare drum, and fuzztone. The other is the smoother, darker sound of the bass. At the beginning of each verse, Richards switches off the fuzztone, and Jagger baby talks the line "I can't get no satisfaction," matching his vocal timbre to the bass and (now fuzzless) guitar. Then he and Richards sing the words "'Cause I try and I try and I try and I try," singing higher and louder until their voices recede into the recorded mix of instrumental timbres. At the highest sung pitch the voices closely resemble the fuzztone, which Richards then switches back on. Jagger sings solo for the duration of the verse, matching his voice to the fuzztone timbre. He begins the next verse in baby talk and the entire process begins again. The polar sonorities of the rhythm section remain constant, with the melodic bass distinctly separated from the mechanistic snare drum and tambourine. But electric guitar and voice modulate from darker, throatier sonorities to brighter, raspier sonorities, then back again.

In the wake of "Satisfaction," fuzz became a standard color in the palette of electric guitar sounds by late 1965. "Distortion" controls and switches appeared on amplifiers, "fuzz" knobs on guitars. Several electronics companies began to issue their own versions of the fuzz effects pedals—with names ranging from the "Distortion Booster" and the "Tone Bender" to more metaphorical titles, such as the "Astrotone" and the "Pep Box." One could hear fuzz guitar in everything from cheaply made garage band records to slick pop and even prime-time television themes.[29]

By the end of 1966 the "distorted" sound of fuzz became a standard of stylistic purity—as suggested in the magazine *Popular Electronics*. For years the magazine

[25]See Platt et al., *Yardbirds*, 55. Both versions may be heard on several compilations, e.g., *The Yardbirds: The Studio Sessions, 1964-1967* (Charly Records CD 187).

[26]Quoted in Dalton, *Rolling Stones*, 53.

[27]His comment about it being a "gimmick" may be found in Victor Bockris, *Keith Richards: The Biography* (New York: Poseidon, 1993), 93.

[28]This and all the Richards quotes in this paragraph are taken from Dalton, *Rolling Stones*, 53.

[29]The show was *Green Acres*, which premiered September 1965. The guitar was played by Tommy Tedesco, who used a Maestro pedal.

showed amateurs how to build sound equipment that minimized distortion. Now an article suggested that fuzz was no longer a sign of damage but a hallmark of musical achievement: "As you listen to rock 'n' roll by the big time performers, do you often wonder how they can get that fuzzy, raspy, piercing sound from an electric guitar while nonprofessional groups sound distinctively small-time?" The article went on to instruct amateurs how to build a device that would "sound as if [it] were tearing your speaker to shreds"—for less than three dollars.[30]

The Seattle-born guitarist Jimi Hendrix turned fuzz from a mannerism into an art. In late 1966 he moved to London, partly because he wanted to learn how to make his guitar sound like Beck's in "Heart Full of Soul."[31] Fortuitously, Hendrix met Roger Mayer after a January 1967 performance and experimented with some of Mayer's guitar effects-boxes in the dressing room. Thereafter, the two collaborated on fuzz and other effects until Hendrix's death in 1970. Mayer made over a dozen fuzz boxes for Hendrix, using several different designs customized to the sound Hendrix wanted. Hendrix became increasingly fastidious about fuzz; one of his road managers recalls him occasionally "screaming" that "this fuzz box isn't right" and trying several before he found the one with the right distortion.[32] As the flamboyant and virtuosic Hendrix became the most influential rock guitarist of the late 1960s, he alerted listeners to a widening palette of fuzz guitar subtleties.

Through fuzz the guitar assumed a new identity in rock music. What was the model for that identity? Robert Palmer suggests that amplified guitar sonorities such as fuzz turned the guitar into a huge bell—a resonant, overtone-laden chiming sound, full of a "clanging" that "ritually invoke[s] sonic space."[33] And this is precisely what Link Wray had created in "Rumble"—a massive, carillon-like instrument that made the guitar sound both majestic and ominous. By simply defacing his amplifier speaker, Wray seemed to intensify the natural overtones of metal strings, creating what Carlos Santana called distortion's "rainbow effect."[34]

But there is ample historical evidence to suggest that distortion was designed to change the guitar into a saxophone—not just a sustaining instrument that can "solo" (a point that Palmer readily concedes), but a wordless variant of the buzzing, roaring voice that exemplified African American ideals of singing as dramatic expression. While the saxophone required a huge amount of physical exertion and dexterity to produce its effects, the overdriven guitar made a similar sound with ease, as electrical energy supplanted bodily force. Players no longer had to coordinate throat, tongue, and lungs. Instead they could turn on a switch and pick the strings. One could play with the buzzing instrumental sound almost endlessly (the only limitation being the durability of one's fingers).

This transformation assured rock's connection to what in the early twentieth century was known as futurism—an aesthetic that glorifies the sounds of technology. In the

[30]Craig Anderton, "Build a 'Fuzzbox' for Under $3," *Popular Electronics* 26 (January 1967): 87-92.

[31]Mitch Mitchell with John Platt, *Jimi Hendrix: Inside the Experience* (New York: St. Martin's, 1990), 43.

[32]Eric Barrett, "A Roadie's Nightmare," *Guitar Player* 9 (September 1975): 33.

[33]Palmer, "Church of the Sonic Guitar," 651.

[34]Quoted in "Distortion Tips," 45.

early twentieth century it was the technology of machinery; in the late, the technology of electronics. Thus, Johnny Ramone explains that he "always wanted to get a sound like electricity" on his guitar;[35] that fairly well sums up the futurist aesthetic. Moreover, futurism seeks to incorporate some of the inadvertencies of technology into its aesthetic—accidents, wear, breakage, ruin. Thus Andy Parypa proudly notes that his distorted playing made his group the Sonics sound "like a trainwreck"—a standard futurist image.[36]

Nevertheless, fuzz imbued the electric guitar with a soul it had not had. As many guitarists have observed, distortion gave the guitar a sense of personality—it "enlivened" the sound, gave it "character," to the point where, as Eddie Kramer remarked, the particular distortion a player used became "synonymous" with his or her "individuality."[37] In this way fuzz arose from both the western tradition of developing a "singing" tone on one's instruments and the African tradition of developing a distinctive "personal" sound on one's instrument. From the mid-1960s on, electric guitar players used countless variations on the fuzz idea to give themselves unique, inimitable basic sonorities.

Through fuzz, a guitarist could give his or her instrument a voice. It might be the transcendent, Middle-Eastern voice of "Heart Full of Soul," the brassy, urban voice of "Satisfaction," or anything in between. It might even be the voice of another species—the barking of "Train Kept A-Rollin'," the snarling of "Zip A Dee Doo Dah," or the buzzing of "2,000 Pound Bee." In every case, whatever the means of distortion, fuzz gave a guitar its own peculiar vocal "grain."

In the process, the guitar—once known as the "queen of instruments"—became an intensely masculine expressive tool. Through distortion its tone became, as one guitarist put it, "testosterone-laden."[38] That pretense of virility in the sound of the guitar corresponded to the aggressive images in the titles of guitar instrumentals—gangfights, rockets, trains, buzzsaws, and 2,000-pound bees.[39] The primary emotion was anger, a point observed even in Guitar Slim's overdriven playing, of which one observer commented, "it really sounds like he's mad at somebody."[40] The next generation found in fuzz the "overdriven-ness" of youth, the explosive hormonal diffusion in creatures whose social status was rigorously contained by their elders.

Through its aggressive, futuristic sound, fuzz was at the core of the machismo aesthetic of a new rock avant-garde—garage rock. Moreover, in psychedelic rock, the guitar would effectively exchange places with the voice, gaining its own multiple personalities through electronic special effects of which the fuzz box was only the beginning.

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[35]Quoted in ibid., 47.
[36]Quoted in Notes to *Here Are the Ultimate Sonics.*
[37]Quoted in Chris Gill, "Dialing for Distortion: Sound Advice from 10 Top Producers," *Guitar Player* 26 (October 1992): 86.
[38]Kim Thayl, quoted in "Distortion Tips," 46.
[39]The term "buzzsaw" comes from the fuzztone record of that title by the Gee Cees (led by Glen Campbell), issued ca. 1962.
[40]Unattributed quote in Obrecht, *Blues Guitar*, 134.

28

Auto-Tune: Why Pop Music Sounds Perfect (2009)

Josh Tyrangiel

When you're working with a great singer whose pitch is right on, you can still apply Auto-Tune. *I'll throw a chromatic* Auto-Tune *[patch] onto the vocal with a kind of mellow responsiveness level, which gives it a nice chorus/flanging effect. I'll print the effect to a separate track and then paste it into the comped vocal mix at the end. You hear that kind of sound a lot now on female voices, like Christina Aguilera, and on a lot of really soulful R&B vocals. It's not there to fix the vocal; it's there to be part of the vocal sound.*

—Engineer/programmer Josh Binder (Daley 2003)

Sonic special effects have long played an important role in making hits, from the slap-back echo on Elvis's "Blue Moon Of Kentucky" in the '50s, to the fuzz guitar sound of the Rolling Stones' "Satisfaction" in the '60s, to the talk box guitar effects of Joe Walsh ("Rocky Mountain Way"), and Peter Frampton ("Do You Feel Like We Do") in the '70s, to the vocoder vocals of Styx in the '80s ("Mr. Roboto"). The year 1998 brought still another effect: the strange wobbly sound of Cher's voice in her hit "Believe." That sound was created with a software program called Auto-Tune, which had been deliberately mis-set to produce the effect (yet another example of a creative misuse of technology leading to a new sound or style). Today that "abused Auto-Tune" sound (the term comes from Bradley 2009) is ubiquitous in popular music, particularly hip hop (T-Pain, Lil Wayne, and many others), and it has spread to other aspects of our culture (e.g., "Autotune the News"). For many, the effect has become tiresome.

Auto-Tune also continues to be used in recordings as it was originally intended—to correct imperfect tuning on the part of singers and instrumentalists. And as Josh Tyrangiel, former music critic and editor at TIME magazine and current editor of BusinessWeek, notes, here lies a more important issue: the Auto-Tuned perfection of pitch heard on most modern recordings has

made us forget the sound of real singing, and allowed artists to bypass the tried and true process of multiple takes that formerly helped them to create memorable performances.

If you haven't been listening to pop radio in the past few months, you've missed the rise of two seemingly opposing trends. In a medium in which mediocre singing has never been a bar to entry, a lot of pop vocals suddenly sound great. Better than great: note- and pitch-perfect, as if there's been an unspoken tightening of standards at record labels or an evolutionary leap in the development of vocal cords. At the other extreme are a few hip-hop singers who also hit their notes but with a precision so exaggerated that on first listen, their songs sound comically artificial, like a chorus of '50s robots singing Motown.

The force behind both trends is an ingenious plug-in called Auto-Tune, a downloadable studio trick that can take a vocal and instantly nudge it onto the proper note or move it to the correct pitch. It's like Photoshop for the human voice. Auto-Tune doesn't make it possible for just anyone to sing like a pro, but used as its creator intended, it can transform a wavering performance into something technically flawless. "Right now, if you listen to pop, everything is in perfect pitch, perfect time and perfect tune," says producer Rick Rubin. "That's how ubiquitous Auto-Tune is."

Auto-Tune's inventor is a man named Andy Hildebrand, who worked for years interpreting seismic data for the oil industry. Using a mathematical formula called autocorrelation, Hildebrand would send sound waves into the ground and record their reflections, providing an accurate map of potential drill sites. It's a technique that saves oil companies lots of money and allowed Hildebrand to retire at 40. He was debating the next chapter of his life at a dinner party when a guest challenged him to invent a box that would allow her to sing in tune. After he tinkered with autocorrelation for a few months, Auto-Tune was born in late 1996.

Almost immediately, studio engineers adopted it as a trade secret to fix flubbed notes, saving them the expense and hassle of having to redo sessions. The first time common ears heard Auto-Tune was on the immensely irritating 1998 Cher hit "Believe." In the first verse, when Cher sings "I can't break through" as though she's standing behind an electric fan, that's Auto-Tune—but it's not the way Hildebrand meant it to be used. The program's retune speed, which adjusts the singer's voice, can be set from zero to 400. "If you set it to 10, that means that the output pitch will get halfway to the target pitch in 10 milliseconds," says Hildebrand. "But if you let that parameter go to zero, it finds the nearest note and changes the output pitch instantaneously"—eliminating the natural transition between notes and making the singer sound jumpy and automated. "I never figured anyone in their right mind would want to do that," he says.

Like other trends spawned by Cher, the creative abuse of Auto-Tune quickly went out of fashion, although it continued to be an indispensable, if inaudible, part of the engineer's toolbox. But in 2003, T-Pain (Faheem Najm), a little-known rapper and singer, accidentally stumbled onto the Cher effect while Auto-Tuning some of his vocals. "It just worked for my voice," says T-Pain in his natural Tallahassee drawl. "And there wasn't anyone else doing it."

Since his 2005 debut album, T-Pain has sent a dozen slightly raunchy, mechanically cheery singles into the Top 10. He contributed to four nominated songs at this year's Grammys on Feb. 8 and his influence is still spreading. When Kanye West was looking for an effect to match some heartbroken lyrics, he flew T-Pain to Hawaii to see how many ways they could tweak Auto-Tune. Diddy gave a percentage of his upcoming album's profits to T-Pain in exchange for some lessons. Even Prince is rumored to be experimenting with Auto-Tune on his new record. "I know [Auto-Tune] better than anyone," says T-Pain. "And even I'm just figuring out all the ways you can use it to change the mood of a record."

Other sonic tricks have had their moment—notably Peter Frampton's "talk- box," a plastic tube that made his guitar sound as if it were talking—but in skilled hands, Auto-Tune is the rare gimmick that can lead to innovation. On T-Pain's latest album, *Thr33 Ringz*, tracks like "Karaoke" and "Chopped N Skrewed" literally bounce between notes, giving the record a kids-on-Pop Rocks exuberance. Using the same program, West's *808s & Heartbreak* is the complete opposite—angsty, slow and brutally introspective. West sings throughout, and while he couldn't have hit most of the notes without Auto-Tune, he also couldn't have sounded as ghostly and cold, and it's that alienated tone that made *808s* one of the best albums of last year.

Plenty of critics raved about West's use of Auto-Tune, but T-Pain is often dismissed as a novelty act. (Not that he minds: "I'd rather be known for something than unknown for nothing.") But unlike most singers, he acknowledges the impact Auto-Tune has had on his career. Of the half a dozen engineers and producers interviewed for this story, none could remember a pop recording session in the past few years when Auto-Tune didn't make a cameo—and none could think of a singer who would want that fact known. "There's no shame in fixing a note or two," says Jim Anderson, professor of the Clive Davis department of recorded music at New York University and president of the Audio Engineering Society. "But we've gone far beyond that."

Some Auto-Tuning is almost unavoidable. Most contemporary music is composed on Pro Tools, a program that lets musicians and engineers record into a computer and map out songs on a visual grid. You can cut at one point on the grid and paste at another, just as in word-processing, but making sure the cuts match up requires the even pitch that Auto-Tune provides. "It usually ends up just like plastic surgery," says a Grammy-winning recording engineer. "You haul out Auto-Tune to make one thing better, but then it's very hard to resist the temptation to spruce up the whole vocal, give everything a little nip-tuck." Like plastic surgery, he adds, more people have had it than you think. "Let's just say I've had Auto-Tune save vocals on everything from Britney Spears to Bollywood cast albums. And every singer now presumes that you'll just run their voice through the box."

Rubin, who's produced artists as diverse as the Dixie Chicks and Metallica, worries that the safety net of Auto-Tune is making singers lazy. "Sometimes a singer will do lots of takes when they're recording a song, and you really can hear the emotional difference when someone does a great performance vs. an average one," says Rubin. "If you're pitch-correcting, you might not bother to make the effort. You might just

get it done and put it through the machine so it's all in tune." Rubin has taken to having an ethical conversation before each new recording session. "I encourage artists to embrace a natural process," he says.

With the exception of Milli Vanilli's, pop listeners have always been fairly indulgent about performers' ethics. It's hits that matter, and the average person listening to just one pop song on the radio will have a hard time hearing Auto-Tune's impact; it's effectively deceptive. But when track after track has perfect pitch, the songs are harder to differentiate from one another—which explains why pop is in a pretty serious lull at the moment. It also changes the way we hear unaffected voices. "The other day, someone was talking about how Aretha Franklin at the Inauguration was a bit pitchy," says Anderson. "I said, 'Of course! She was singing!' And that was a musician talking. People are getting used to hearing things dead on pitch, and it's changed their expectations."

Despite Randy Jackson's stock American Idol critique—"A little pitchy, dawg"—many beloved songs are actually off-pitch or out of tune. There's Ringo Starr on "With a Little Help from My Friends," of course, and just about every blues song slides into notes as opposed to hitting them dead on. Even Norah Jones, the poster girl of pure vocals, isn't perfect. "There's some wonderful imperfections of pitch on 'Don't Know Why' from *Come Away with Me*," says Anderson, "and most of the other tunes on the album as well. But I wouldn't want to change a single note."

Let's hope that pop's fetish for uniform perfect pitch will fade, even if the spread of Auto-Tune shows no signs of slowing. A $99 version for home musicians was released in November 2007, and T-Pain and Auto-Tune's parent company are finishing work on an iPhone app. "It's gonna be real cool," says T-Pain. "Basically, you can add Auto-Tune to your voice and send it to your friends and put it on the Web. You'll be able to sound just like me." Asked if that might render him no longer unique, T-Pain laughs: "I'm not too worried. I got lots of tricks you ain't seen yet. It's everybody else that needs to step up their game."