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CHAPTER 15

THE SONIC PLAYPEN: SOUND DESIGN AND TECHNOLOGY IN PIXAR'S ANIMATED SHORTS

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INTRODUCTION

IN 1986 a newly formed, high-tech startup company named Pixar began producing animated shorts in order to challenge its designers to develop computer applications that showcased the design possibilities of its new technology—the Pixar Image Computer, which could render photorealistic images albeit in a rudimentary way. A few years earlier, these same engineers worked with George Lucas and Industrial Light & Magic (ILM) to develop special-effects software and sequences for Hollywood studio features such as *Young Sherlock Holmes* (1985) and *Star Trek II: The Wrath of Khan* (1982), for which they created the "Genesis effect" (named for a science probe that generated a planet out of "lifeless rock"). Eventually, Pixar transformed from a computer company to become a leading studio in the field of 3-D computer-generated animation, and its efforts marked Hollywood cinema's

transition into the digital age. Much like the impact of cinema's transition to sound in the late 1920s, this new focus on computer-based production processes shifted industrial practices, established new studio styles, and fostered a new form of filmmaking. This revolution was not entirely image based, however. Concurrently, film sound was undergoing a digital transformation of its own with the introduction of new sound formats such as Dolby Digital and Digital Theater System (DTS) and the rise of the sound design movement, which was driven in part by new portable recording and mixing devices, multichannel exhibition, and changes in the mode of sound production.

Using a variety of theoretical perspectives from digital culture, sound studies, and traditional film studies, I argue that as the techniques of computer-generated animation developed at Pixar, sound design became an integral aspect of this new mode of storytelling and overall filmic design. Foregoing an exclusively onomatopoetic approach to sound, defined by the *bangs*, *booms*, *zooms*, and *honks* commonly found in traditional cartoons, sound designers at Pixar worked with producers, directors, animators, and software engineers to establish an unprecedented unification of sound and computer imagery by borrowing live-action production techniques and reworking traditional animation strategies for sound use. In regard to technology, Pixar's sound designers adopted new portable recording devices for the collection of sound effects, unified these "raw sounds" with the aid of sound samplers like the Synclavier and, later, software like Pro Tools, and mixed their efforts in the newest multichannel formats typically reserved for feature productions. More important, sound designers like Ben Burtt (*Star Wars* series, *WALL-E*) and Gary Rydstrom (*Terminator 2: Judgment Day*, *Saving Private Ryan*, and *Monsters Inc.*), who worked on many of the initial shorts, fostered audio strategies that emphasized sound perspective, spectacle (localization of effects and the establishment of offscreen space and environmental effects), and "hyperrealism" (a technique Rydstrom would later adapt to films such as *Jurassic Park* and *Titanic*, which were also heavily laden with computer graphics, or CG). These technological innovations and new aesthetic approaches quickly established the sound-image relations in Pixar films as cinematically credible and viable for filmgoers. In short, the sound designs "sold" the images. The short films produced at Pixar are important in regard to this trend because they established the aesthetic and production patterns that formed the studio's house style, which eventually migrated into the company's successful feature films such as *Toy Story* (1995), *Finding Nemo* (2003), and *Up* (2009). In the short films, which make up the case studies for this chapter, sound is not only a dominant formal element, but also an important thematic one, principally as it relates to the notion of play. Many of the shorts explore childrearing and children's games as a form of play, the interaction of sound and images as play, and the notion of play associated with music performance and the voice. From *Luxo Jr.* (1986) to *Jack-Jack Attack* (2005), filmgoers are immersed in a kind of sonic playpen, surrounded by innovative sound designs and computer images that have reshaped our notions of cinema and animation in the digital age.

Sound Design's Expanding Role in the Era of Digital Animation

Animation is unique within the mode of Hollywood film production, above all in relation to sound. Typically, the overall sound track for any film consists of dialogue, music, and effects (Foley, hard effects, and ambiances), and within Hollywood cinema, a hierarchy has formed around issues of the voice, predominantly focusing on narrative intelligibility or who *tells* the story.[1] For this reason, the dialogue tracks form the scaffolding around which the entire sound track for a live-action feature is designed. Traditional animation, however, lacks production recordings and sometimes even dialogue, which is the case in a number of the Pixar shorts. This lack offers both creative freedoms and challenges for sound designers, who must not only develop the specific sounds for the film but also establish the overall rhythm of the film, which supports the story beats, character actions, and plot points. In the 2001 Academy Award–winning short *For the Birds*, director Ralph Eggleston and sound designers Tom Meyers and Jory Prum build comedic tension around the squeaks, squawks, and pecking of a gang of birds who want their club to remain exclusive. In a rhythmic chant of squeaks (recorded from a collection of "squeaky toys"), the birds egg on two of their flock to peck at the feet of a gangly outsider, who dangles precariously upside down from the telephone wire on which they are all perched (Amidi 2009, 30). Gravity and a well-timed moment of silence on the sound track provide the crucial comedic punch line as the birds achieve their goal but are launched upward (and featherless) with the sharp sound effect of a "boing." Sound and image work together rhythmically to comment on the absurdity and perils of a mob mentality without ever resorting to the use of dialogue. It is important to note that the choice of squeaky toys to create the character sound designs accesses nostalgic notions of childhood play and the tactile sensations and emotional delight of squeezing these air-filled toys. The visual design of the plump little birds reinforces the concept, and, even within the narrative action, the larger bird puffs and honks at the air that is filled with tiny feathers from the now naked flock. It is a comedic gesture that affirms the themes of air and flight, breathing and exhaling, and silence and squawking. In this way, play and peril are linked through sound.

Since its introduction in the 1970s, the term *sound design* has been multifaceted in its application and definition within cinema and sound studies. One of the initial definitions of sound design comes from the process of designing specific sound effects like those noted earlier. Animation has always been highly adept at creating and applying individual sounds for sonic punctuation and comedic effect, borrowing techniques from radio and the theater. As sound historian Robert L. Mott has noted in relation to early Disney animation, "When Mickey Mouse hit a baseball over the fence, the sound of the hit was provided by a wooden block, and the slide whistle sounded as the baseball went soaring into the air" (Mott 1990, 83).

These sound effects displaced realistic sounds to create broad comedic gestures or slapstick, which Charlie Chaplin once called "playful pain" (Mott 1990, 80). These early sound constructions have since become cliché. While sound designers today often apply the same strategies of timing and comedic intents, the sounds are much different in their material manufacture, as well as spatial encoding and aesthetic design. This new approach is currently supported by sound-editing software like Pro Tools, which has consolidated sound editing, mixing, and previewing into a virtual work environment. Within the program, the sound session for a particular sequence is laid out horizontally, providing a graphic representation of the sound wave forms for each individual effect, which can then be manipulated by using various sound filters (high- or low-frequency pass filters, for example) or processors. This digital system differs from the previous magnetic film system in that effects can be layered without significant noise buildup, sound sets can be created and stored within the digital environment for easy recall, and composite sound effects can be previewed in stereo or even multichannel formats without delay. Gone are the days when sound personnel would have to wait until the final mix to hear the composite sound effects.

In the Pixar short *Luxo Jr.*, a baby lamp pops a ball, which deflates with a comedic whistle of air. Unlike the earlier Disney example, the sound-effects design is multilayered. It includes the squeak of the plastic as the ball rolls on the hard wood surface, the pop of plastic, the expulsion of air through a plug, the deflating whistle, and the shifting of the coiled springs of the tiny lamp as it rides the ball down. In addition, the effects are recorded in close perspective to their sources using a portable Nagra in order to anchor them with a sense of image and sound credibility. This is not to suggest that the sound designer just gathers one version of each of these effects and combines them for the desired result. Sound design is a process of ongoing experimentation. Gary Rydstrom notes, "I have a PowerPoint to explain the design process that I use when I lecture about sound. The first slide reads, *Record a sound, try it, find it doesn't work.* The next card reads, *Select another sound, try it, find it doesn't work*, and so on. I keep doing this until I get to the final card that reads, *Run out of time*" (Rydstrom 2010). The design process in the digital age is one of nearly infinite choices that are limited only by aesthetic imagination and, of course, postproduction economics. While the comedic outcomes remain similar between the old and the new animation forms in the *Luxo Jr.* short, the sensibilities of design and their organization have shifted to create a heightened cinematic reality that resembles live-action sound.

The development of overall aesthetic sensibility for computer-generated animation is in part due to the involvement and sensibilities of specific sound personnel, considerations that are linked to another definition of the term *sound design.* Historically, the term *sound design* has also been applied to "the planning and patterns of the overall sound track" by a specific individual (Whittington 2007, 2–3). In many cases, the sound designer becomes akin to the director of the sound track, making sure that the various film reels exhibit thematic and formal unity. This is accomplished by the control of sonic aspects such as the use of leitmotifs, the design

of effects for emotive impact, and attentiveness to mix practices. The key sound designers at Pixar have been Ben Burtt, Gary Rydstrom, and Tom Meyers (*Pitch Black*, *Armageddon*, and *Up*). In the Academy Award–nominated short *Lifted*, the film's director, Gary Rydstrom, makes playful reference to being a sound designer by comically drawing parallels between the job of the mixer and the job of a young teenaged alien learning to abduct humans from a hovering spacecraft. In this homage to Steven Spielberg's *Close Encounters of the Third Kind* (1977), an alien trainee named "Stu" sits behind a vast console of toggle switches (an analogy to a sound-mixing board), trying to retrieve his target human from a farmhouse. All the while, he is being graded on his very spotty performance by a gelatinous and impassive instructor (a stand-in for a producer/director). The overall sound-design strategy is an exercise in cross-cutting, as Stu's frustrated actions, articulated by the sounds of his hands raking the console and a Pong-like computer ping, lead to the abducted man being flung about the interior of the home. The sound design illustrates this through various thumps, body hits, and crashes. Causality is the source of the comedy, but the analogy to the perilous process of Hollywood filmmaking cannot be missed. Sound designers are always under the scrutiny of someone, whether it be the producer, the director, or other sound personnel. Finally, the instructor intervenes at the console and reverses the chaos by returning the abductee to his bed. The lesson of this exercise in computer animation is that at times sound and image design are about interplay. As in the performance of a duet, the comedy can be drawn from either side of the design equation. For example, when the abducted man gets stuck in the tree, the visual track reveals a static wide shot of the tree and a long beam of light emanating from the flying saucer. At the same time, the sound track offers the "brutal" sounds of the crunching of leaves and tree branches, as well as body parts, as the man gets stuck, clearly offering filmgoers an example of Chaplin's "painful play" (Amidi 2009, 39).

For Rydstrom, if the sound design is recorded and organized well, it "merges into the image, brings it to life," and the constructions are "not cartoon-y" but rather "reality-based" (Kenny 2004, 1–2). This is the foundation of his "hyperrealistic" sound-design style, a philosophy that draws inspiration from hyperrealism in visual culture, which is interested in our perception of the "real," a property that is both the subject and objective in hyperrealistic art. In the field of sound design, Rydstrom creates stylized constructions that access familiar sounds (raw sound "events"), yet he recombines these effects to create seamless sound impressions that are viscerally dynamic, anthropomorphic, and preoccupied with codes of heightened cinematic realism often found in live-action film. His goal is not to create an exact duplicate or simulation of a sound event, but rather to provide a lie that tells a dramatic *truth*. In unpacking this lie, we find cinematic codes of spatial and temporal design, genre expectations, and the engagement of an array of psychoacoustic properties of sound. Visual equivalents of these properties (mainly an attentiveness to movement, space, and temporality) have been a goal of animated Disney films from the very beginning. Digital theorist Andrew Darley notes, "Precedents can be found in Disney Studio's attempts, from the late 1930s, to mobilize *certain* of the

existing aesthetic codes of classical narrative cinema (live action) and to integrate them in a more rigorous fashion than had hitherto been the case within drawn cartoon form" and in doing so provided a "heightened realism" (Darley 1997, 19). Rydstrom adapts this approach to sound design.

Early in their careers, many of the key sound designers at Pixar were associated with San Francisco Bay Area film-production companies and sound houses such as Sprocket Systems, later redubbed Skywalker Sound. They have collaborated with various directors such as James Cameron, Francis Ford Coppola, John Lasseter, George Lucas, and Steven Spielberg. These sound-conscious filmmakers encouraged and in many instances demanded innovations in relation to sound technology, mixing, and design. As a result, the duties of sound-effects recording, editing, Foley, and mixing became less constrained in terms of the division of labor within the mode of production. This shift arose in part as independent production units adopted collaborative strategies that grew out of production approaches from film schools and very low-budget productions in which every member of the crew was required to perform one or more tasks. According to Rydstrom, this environment fostered an important "mentoring" network for a core group of sound designers, in which attentiveness to sound experimentation and technological innovation was the norm, unlike the hierarchical system within the classical Hollywood mode of production (Kenny 2004, 1). John Lasseter, Pixar's chief creative officer and one of its most important directors, agrees with this assessment: "As a manager, it is my task to abolish hierarchies" (Reis 2009, A6). This sense of collaborative creativity in the field of sound was carried over to the newly formed Pixar Animation Studio and integrated well into its creative environment, which was attempting to blur the lines between filmmaking and computing.

Technological Innovation and Animation in Transition

The exchanges between technological development and aesthetic design are at the core of the Pixar philosophy, and they have deeply influenced the image and sound styles that have emerged at the studio. According to Lasseter, "Art challenges technology, and technology inspires the art. That's it in a nutshell—the way we work at Pixar" (Milsom 2008, 08:50 min.). One of the key pieces of sound technology adopted very early by Pixar sound personnel was the Synclavier, a synthesizer that was modified with a Winchester diskette add-on and floppy drive (and later a hard drive) to function as a sound sampler that could hold a library of "raw" materials for instant access and manipulation. According to Rydstrom, "With sampled sounds in RAM, you can instantly pitch-bend it and layer it and play it without using any processing time" (Kenny 2004, 3). In his short *Lifted*, Rydstrom worked

with a similar yet far more advanced software-based system to build the frustrated vocalizations of the alien trainee, "Stu," using sampled growls and vocalizations from his own dog, Sparky. In the short film *Tin Toy*, the Synclavier technology brought together all of the sounds for the one-man band "Tinny," including his horn, drum, and cymbals. During the production process, the Synclavier allowed the consolidation of the duties of a sound recordist, editor and mixer, which supports the aims (and definition) of the sound designer. Among sound scholars and practitioners, there is consensus that technological developments such as the Synclavier and Digidesign's Pro Tools formulate an essential part of the definition and process of sound design. In fact, sound designer and editor Walter Murch (*THX1138*, *The Conversation*) first associated the term with his experience using the quadraphonic exhibition technology during the development of the sound track for *Apocalypse Now* (1979). As he used the multichannel technology to map out the sound fields established by the various speakers in the motion picture theater, he would drape or "design" sound effects and music like a set designer in order to establish an immersive experience for the filmgoers.

Historically, sound technology has never been fixed or standardized within the mode of production, however. From the very earliest attempts at film sound synchronization, the development and use of sound advances have sprung from a complex set of drivers, including economic competition, licensing and patents, exhibition quality control, and, perhaps most important of all, the particular needs of a specific film production. Innovation often results from logistical and production challenges that arise from a particular story that is being told. Similarly, innovation within the field of animation has not been a fixed or formal process. The needs of animated stories have often driven the development of specific audio and visual technologies and techniques. In the 1940s, for example, Disney developed the multiplane camera setup, an animation stand that allowed cels to be divided into layers to simulate depth of field, and "these [cels] could be moved frame by frame at varying rates toward or away from the camera, giving a powerful illusion of gliding through a three-dimensional space" (Thompson and Bordwell 1994, 261). This technique was developed for use on films such as *Pinocchio* (1940) and *Bambi* (1942), and it arguably set the stage for the development of 3-D exhibition technologies, which have become part of the production and exhibition strategies of the current computer-animation cycle. In regard to sound technology specifically, Disney also worked with RCA at this same time on the development of a new multichannel sound presentation for *Fantasia* (1940), which featured what many describe today as the precursor to "surround sound." The goal was to separate various orchestral instruments to match the movements of the characters within the animated musical sequences of the film. This effect was achieved by using two separate but interlocked optical tracks. In one configuration scheme, the speaker array consisted of fifty-four speakers throughout the theater and provided one of the first multichannel experiences for filmgoers. While the system was never adapted as an industry standard, it did present the possibility of a new cinematic-sound experience that would inspire companies like Todd AO and later Dolby to pursue multichannel

exhibition possibilities (Blake 1984, 20). The coupling of image and sound developments presented a unique opportunity for Disney to reshape not only animation as form but also the visceral experience of cinema itself for filmgoers by creating new immersive environments for audiovisual play.

In their move to lead Hollywood cinema into the digital era, Pixar brought this approach up to date by embracing the power of computing for both image and sound production. They also coupled these developments with new exhibition formats from multichannel to 3-D presentation but always within the context of the character-based stories they wanted to tell. The blending of technological concerns and design considerations is never easy, however. As Steve Jobs has noted, "Pixar did an impossible thing . . . It blended the creative culture of Hollywood with the high-tech culture of Silicon Valley . . . The best scientists and engineers are just as creative as the best storytellers, just in different ways . . . The Pixar culture, which respects both, treats both as equals" (Paik 2007, 295). Central to Pixar's success has been the ability to forge not just a shared vocabulary between the two groups but a successful workflow as well. It is also important to point out that, at Pixar, technology is valued as a necessary component of the design process, not simply a high-tech item or piece of software to be purchased.

To present a more complete understanding of the interplay between computer graphics and sound, it is necessary to specifically address the background related to the integration of computer-generated images into the process (and cultural understanding) of animation and live-action filmmaking. In my previous work on sound, I have discussed the integration of multichannel technology into the Hollywood studio system, and I have noted that within the film industry, technological changes have encountered significant challenges as concerns are often raised regarding economic viability, issues of standardization related to exhibition and production practices, fears of diminished quality control, and lack of widespread testing of potential success (Whittington 2007, 28). The introduction of computer-generated imagery software and hardware by Pixar into the production process faced all of these concerns. Pixar's cofounder and president, Dr. Ed Catmull, has noted that during the period of early development in the 1970s and 1980s, both "artists and studios disliked and feared computers. . . . But even in that environment, a few small groups had the vision to use the computer for picture making. At that time, we thought a lot about what it would take to make the process economical and practical" (Street 1995, 79). Ironically, Disney, in particular, was eager to integrate computers into their highly successful 2-D animation production units—but also wary. Fearing a critical backlash about declining quality due to technological expedience, Disney did not publicly admit to using computers until the DVD release of *Beauty and the Beast.* However, during the 1980s, Disney worked closely with Pixar to create CAPS (Computer-Assisted Production System), a "digital ink-and-paint system that employ[ed] a sophisticated multiplane camera within a digital environment" (Street 1995, 79). The system shifted the labor-intensive process of inking and painting of cels to the digital realm. Ultimately, the Disney executives knew that computers would streamline the production process for animation;

however, their fears about computer technology were realized somewhat when computer-animated productions eventually supplanted 2-D animation techniques and practices in popularity.

While computer-generated images transformed the field of animation, the technology also had an equally profound impact on live-action films and their cultural reception by filmgoers in terms of expectations of credibility and verisimilitude of audiovisual design. As part of their technological focus, Pixar researchers began developing new software, such as Motion Doctor, MenV (Modeling Environment) and notably RenderMan, in order to create virtual characters and environments and to integrate or "composite" computer-generated images with live-action footage. With this innovative software, artists could engage in "image processing," specifically modeling photorealistic images, characters, and sets and incorporating realistic surfacing, lighting effects, and motion blurs that simulated the way photographic film captured action in motion. Early examples of the software's importance can be seen in the water-pod effects in *The Abyss* (1989), the liquid-metal effects in *Terminator 2: Judgment Day* (1991), and the design of the dinosaurs in *Jurassic Park* (1993). The software continues to be the foundation of most special-effects software today, and this technology arguably enabled the cinematic adaptation of books and graphic novels that Hollywood producers once considered unfilmable—from the *Lord of the Rings* series (2001–2003) to *Watchmen* (2009). Not surprisingly, one of the early adopters of the software was George Lucas, who pressed the technology into use to create his densely layered *Star Wars* prequels. As many critics have noted, this intervention raised the important question, In this new age of computer-generated images, what *is* animation?

Between the use of computer graphics for specific special effects and its use to create virtual sets, characters, and action, a blur between the categories of the live-action film and animation began to occur. In turn, this breakdown shifted the cultural reception of various image-sound relations, mainly related to "special effects." Michele Pierson, the author of *Special Effects: Still in Search of Wonder*, argues: "If an effect is only *special* in relation to something else—something that it isn't—how do viewers decide what is a special effect in this context? Does the scope for the kind of transmutation of the visual field that might make an effect special even *exist* once a film begins to be made over in the mode of an animated feature?" (Pierson 2002, 152–53). Initially, filmgoers and critics often contained the "work" of computer-generated images within the category of spectacle or special effect and addressed specifically the verisimilitude and authenticity of particular constructions. In short, filmgoers and critics were asking, "Does this special effect *look* like an effect?" And for the longest time, because of the rudimentary nature of the computer graphics (which were heavily support by sound), this was an easy question to answer.

However, this question lost it authority as the integration of live-action and computer-generated images became more refined and seamless and as computers have made their way into every aspect of the mode of production from color timing to film printings. As a result, the clear distinction between live-action and

computer-generated animation has fallen away. Contemporary blockbuster films such as *Spiderman* (2002), *The Hulk* (2008), and *Avatar* (2009) regularly combine both forms, and the result has been a reshaping of cultural expectations around image-sound relations for these types of films. The debates have moved from questions about credibility to questions of immersion, visceral spectacle, and emotional resonance, as they support a new "cinema of sensation." This shift has also been supported by the rise in console video games, which offer various game environments that regularly blur the lines between live-action and animation without significant objection or notice from gamers. Historically, Pixar's films benefited greatly from this blurring of the lines. Specifically, computer-generated animation is no longer marginalized into the category of cinematic gimmick or novelty; rather, it has established itself as a unique form of filmmaking. As director Brad Bird argues, "Oftentimes people call [computer] animation a genre, and that's completely wrong. It's a medium that can express any genre" (Corrlis 2004, 80).

In addition to creating a new form of filmmaking, computer-graphics technology has even challenged the hierarchies and divisions of labor that once separated the areas of visual design such as lighting, set design, cinematography, and costuming. Today, one artist with a computer workstation and the right software can perform all of the tasks of set designer, costumer, cinematographer, and even lighting gaffer if needed. In many ways, the collapse of these duties and the merged production processes mimic the way in which sound design emerged as a new mode of production. It is historically important to note that sound design leads the way in theory and practice in this era of visual culture. I would even go so far as to argue that sound design is *the* crucial factor that has fostered the new perceptual gestalt of computer-generated animation in the digital age—a model of understanding that computer-generated images cannot fully achieve alone. Despite the efforts of computer images to seamlessly bring together collages of unexpected elements—animated or live-action—the current historical poetic of cinema in the digital age demands that the sound design present equally refined constructions to establish cinematic verisimilitude. In the article "A Back Story: Realism, Simulation, Interaction," Andrew Darley provides a systematic history of visual digital culture and even specifically addresses Pixar's position in the development of visual "techniques (programs) . . . for the various phases and procedures involved in three-dimensional modeling, animation, and rendering," but, like many others, he does not consider the role of sound or music (Darley 2000, 20). One of my aims in this chapter is to offer a counter-history that includes sound design in the discourse of the digital media.

But this raises the question, How do these computer-generated images and sound design come together to be "true?" As various case studies of Hollywood studios in the past have shown, new production processes and shifts in technology are often contained within aesthetic and stylistic perimeters set by the studios or production units. These factors become part of the development of a "house style," which filmgoers eventually recognize and come to expect from that studio.

Pixar's films established not only a new and innovative visual style but also a sonic style that has defined its house style.

Pixar Studio Style: Character Animation, Storytelling and Sound Design

From the very inception of Pixar, the founders were determined to focus their efforts on creating character-based films by using computer animation. According to *Toy Story* director, John Lasseter, "The animation was the groundbreaking thing about this movie; but our intention was for the audiences to get so caught up in the story and characters that they would forget the animation" (Street 1995, 91). This move was in part facilitated by an acceptance of the limitations of the computer technology. It is an axiom within filmmaking that if filmgoers become invested in the plight of characters in a story, they will forgive all manner of technical limitations—and early computer animation faced many limitations. The processing power and memory of the early hardware was severely limited. Specifically, because processing speeds were slow, longs hours were required to render a single image, and, once rendered, the image files presented significant storage and access problems. More important, the software was not adept at creating "organic" images, particularly in regard to modeling animals with fur or human figures (Corliss 2004, 80). For these reasons, the initial short films, like *The Adventures of André and Wally B* (1984) and *Luxo Jr.* (1986), featured characters that were "geometric" and relatively smooth in their visual design (Corliss 2004, 80). In order to mask the rudimentary nature of these images, the filmmakers at Pixar employed a host of cinematic strategies from an emphasis on character-driven stories and genre elements specifically drawn from the tropes of comedy and drama to experiment with formal aspects of the medium, such as rhythmic editing and camera moves, innovative music placement, and hyperrealistic sound design, which established the Pixar house style.

Their first short, *The Adventures of André and Wally B*, is a foundational example of this new style. The film, which was created for the SIGGRAPH (Special Interest Group on Graphics) conference in 1984, features a character named André, whose blissful afternoon is disturbed by a friendly and playful bumblebee, Wally B. In an unexpected homage, the character's names are derived from the 1981 Louis Malle film, *My Dinner with Andre*, and the short also gives a nod to the existential questions raised in the Malle film by referencing the playful nature of connections between people that are both pleasurable and painful (Amidi 2009, 14). In this short, a collaboration of animation styles—both old and new—are evident. The plot is a simple chase in which the anxious André distracts Wally B in order to run

away, thus avoiding a painful sting. However, Wally B zooms after his new friend and delivers an inevitable offscreen sting. Floriane Place-Verghnes, author of *Tex Avery: A Unique Legacy*, places this idea in historical context: "The chase is a recurrent theme in the Averyan corpus and, generally speaking, in the cartoon industry of the late 1940s" and is primarily "an element of acceleration of the rhythm which can lead to total madness" (Place-Verghnes 2006, 137). In this way, the chase calls up the codes of the madcap comedy, a genre category defined by comedians such as Buster Keaton, Charlie Chaplin, and Laurel and Hardy.

While the sound ratchets up the comedic pace through an ever-increasing tempo related to both the music and the sound effects, the characters are the center of attention. Sound design is crucial in creating the integrity of the characters and the comedy of this short, as it both humanizes the characters and lends live-action credibility to their actions. One moment in the film is particularly telling: When André awakens, he *comes alive* with the sound of a yawn, a scratch of his belly, and a yowl that shivers through his frame. The sound design has done what the computer images cannot: It has rendered the character's internal structures (specifically through the breath and vocalizations from his lungs and mouth), his surface texture (through the sound of his hand on his belly), and the integrity of his body (the elasticity of his frame and spine through his throaty and quivering vocalization). The sound designer for this short, Ben Burtt, based his sound-design philosophy on a balance between how an effect might sound in the physical world with the overall dramatic needs or "truth" of the cinematic construction, and both of these factors establish the credibility of this character within the computer-generated environment (LoBrutto 1994, 142).

Lest we forget, this is also a chase comedy, and some elements of traditional cartoon sound and music strategies are blended in as well to transcend the rudimentary image design and to update familiar cinematic gestures as a form of acknowledgement and homage. In particular, Wally B's introduction is characterized by the sound of his flapping wings and buzzing, but these sounds are superseded by the self-reflexive placement of the music from "The Flight of the Bumble Bee." It is clearly the sonic setup for a joke, which will end with a sting. During the chase, sound and picture editing play a crucial role as the camera angle shifts to a bird's-eye view, and Wally B's flight sounds undergo a metamorphosis into the sound of a propeller-driven dive bomber dropping down to deliver its payload. This sound design calls on a long history in animation, in which sounds of the natural transform into the mechanical, and the humor is evoked as the "character loses his fluidity and becomes stilted" (Place-Verghnes 2006, 137). The audio and visual denouement of the short calls on another staple of animation—the role reversal, which is illustrated when an offscreen André (just stung) hurls his hat at Wally B and hits him on the stinger, knocking him out of frame with an onomatopoeic "boing." The evocation of the history of animation style and the new attentiveness to sound-design elements such as sound perspective, localization of sound on- and offscreen, and codes of live-action verisimilitude establish a new gestalt of understandings and expectations for filmgoers. As Ben Burtt notes, "It's forging

those connections between familiar sound and illusionary sound that I think is the basis of the success for a lot of the sound that sound designers have put into these [Pixar] movies" (Milani 2008, 1).

Pixar's style expands on animation tradition by embracing anthropomorphism and recasting it to assist in the design of character "speech," which often mimics human sound patterns and behaviors and even combines human sounds as familiar anchors. In the short film *Luxo Jr.*, Gary Rydstrom offered director and animator John Lasseter an example of this new sound-design strategy:

> I wanted to give the lamps in *Luxo Jr.* character through sound. I told John that I'd come up with these voices. He'd never imagined they'd have voices and was wary of the idea. But I experimented with taking real sounds—a lot of it as simple as unscrewing a light bulb or scraping metal. Every once in a while, a sound would be produced that would remind you of sadness or glee . . . It felt like the birth of something new, even then. (Kenny 2004, 2)

This design approach established an emotional vocabulary for the characters through sound effects, thereby offering an analogy to language. In the film, a tiny Luxo lamp plays with a beach ball while being supervised by a parent lamp. After a mishap that pops the ball, the adult lamp admonishes the pint-sized Luxo with a snap of attention and a wag of its head. The sound design for the adult lamp focuses on punctuating the neck or joint movements of the apparatus, specifically the sound of the snap of the joint and its silence, then a wagging and clicking of metal, an audiovisual gesture that thematically supports the lamp's role as guardian and responsible adult. The visual design reinforces this idea as well by incorporating a light source that shines down on the tiny lamp like a spotlight on the bad behavior. Luxo Jr. deflates with a musical whine accompanied by a deep sigh of metal as if stifling tears. In terms of narrative storytelling, the short taps into the archetype of parent-child dynamics, while also offering a comment on the roller coaster of emotions that young children experience from moment to moment, following the ecstasy and joy of play to the deepest sadness from a sense of the loss of a beloved toy. In this way, the story is thematically about the play of emotions.

According to Lasseter, this short film solidified Pixar's philosophy about film sound and storytelling: "Gary's brilliant work made those lamps so real, so believable. It taught me that sound has an incredible ability to be a partner in the storytelling of a film, and ever since then Pixar has put a lot of emphasis on thinking of the sound as we develop our stories" (Paik 2007, 72). It is, therefore, not surprising that the Luxo Jr. lamp has become the unofficial mascot of the company and even forms the "I" in the company's logo before all of its feature films.

Character-based design strategies are evident in nearly every aspect of the film-making process at Pixar from behavior modeling to set design, yet the philosophies that drive these constructions can be traced back to sound design. As John Lasseter notes:

> Our philosophy for the set [design] came from Gary Rydstrom, our sound designer . . . He taught me long ago that, in doing sound effects, if a ball bounces, you don't just record the sound of a ball bouncing—because when the sound

> effect is cut in, it won't sound like it should. You have to make it bigger. To create the bark of a dog in *Toy Story*, Gary combined dog sounds with tiger sounds to make it bigger and more impressive. That's the philosophy we used in the look of the film. We went beyond reality, caricaturizing to make it more believable. (Street 1995, 83)

This philosophy encouraged artists to consider both the images and the sounds as characters in the film. One of Rydstrom's most important innovations at Pixar was to establish this sense of "hyperrealism," in which sound and images take on multiple layers of meanings and emotion by concentrating not simply on aspects of film form but also on emotional intents, expectations, and intertextual connections such as historical homage. For Rydstrom, this often meant displacing a sound from its original context, augmenting it, then reinserting into a new sound-image pairing to create a heightened effect like the tiger sounds inserted into the bark of a dog. However, rather than entirely stripping the sound of it previous meanings, Rydstrom was borrowing various qualities of the realistic or raw effect and effectively splicing them into a new creation that filmgoers would crane their ears to recognize and accept. For Rydstrom, sound design was the key to establishing the credibility of computer animation: "It was clear to me that this form was a whole new thing that would require a whole new approach to sound" (Paik 2007, 72).

The philosophies of hyperrealism became firmly established at Pixar in the 1989 Academy Award–winning short *Tin Toy*, which became the inspiration for *Toy Story*. The plot centers on "Tinny," a mechanical version of the one-man band, and his first encounter with a curious baby. Terrified at the prospect of being drooled on, Tinny eludes baby "Billy" and hides under a couch, which is where all wide-eyed toys seem to go to elude destructive children. But when the baby stumbles during the chase and begins to cry, Tinny emerges to enchant the child with his musical abilities. The moment is fleeting, however, as the baby quickly moves on to something more enticing—the discarded packaging for the toy. It is a humorous commentary on the attention span of children. It is also the perfect film to exploit the thematic notion of sound design and music as a form of play.

By today's standards, the computer-generated images in this short appear somewhat crude as the baby's oddly textured skin makes it appear more monstrous than perhaps intended, but both the character-based storytelling and the sound design transcend these deficiencies. Once again, there is no dialogue in the film; rather, the images and sound evoke the sense of humor and peril. In dramatic terms, the filmmakers cleverly devised Tinny to be his own worst enemy. His very nature is sonic by the fact that various musical instruments are woven into his jacket. His movements are, therefore, musical—so any chance of a stealthy retreat under the couch is impossible. This type of connection between movement and sound in animation has become known in animation as "Mickey Mousing," whereby the image and sound elements are connected in self-aware synchronization, and, of course, the process is named after the famous Disney character.

While this comedic idea is drawn from traditional animation, it has been completely redesigned for computer-animation. Using the Synclavier, Rydstrom created

a complex database of sounds, including gears, cymbal crashes, drum hits, and horns, as well as eyelid flutters, shivers, and breathing. The instruments were not simply just recorded toy versions but they included also a series of real instruments of different scales, which were recorded with a resonant dynamic range and stacked as needed. In establishing the sound design pattern, Rydstrom composed the sound in layers and engaged them at various tempos, so they not only realistically fit the movement and actions of the character but also serve as score, which heightens the frenetic sense of peril. According to Rydstrom, "The complication for sound in *Tin Toy* was to make it sync up with the animation . . . John [Lasseter] didn't animate the cymbal and drums with the idea of what music he would play" (Amidi 2009, 24).

Along with representing the musical exterior of the character, the sound design also illustrates the inner life of the character through the emotive use of sound. In particular, when the baby falls and begins to cry, all eyes turn toward Tinny, and the accusation is registered through character reaction and sound. With an immediate click of his cymbal, a blink, and the clicking of his neck gear, Tinny turns and, in surprise, realizes what he has done. Shame overcomes him, and he lowers his head; his accordion deflates with a sound like a mournful groan. In these instances, sound provides the emotional language that renders the inner states of the character, which in turn tells the filmgoers how to feel.

In pursuit of an overall unified design, Rydstrom sets these sounds in relief against a bed of immediately recognizable vocal and ambient effects, always balancing traditional animation strategies and live-action expectations. In particular, Rydstrom recorded and edited the vocalizations of a real baby to support the rudimentary images of the "monster child" in the film rather than employing an actor to perform these sounds, which was standard practice in animation at the time. The child's coos and giggles are recorded and edited to mimic a documentary aesthetic style and even include an unscripted sneeze, which was animated into the character design. Rydstrom further heightened the live-action qualities of the environment by implying offscreen space by means of sound effects. Through an open doorway, the sound design implies the audio from a television set as someone channel surfs briefly before finally tuning into to familiar game show *The Price Is Right.* The recording features a sense of spatial encoding. The television effect is recorded from the perspective of the room on-screen, implying distance, and the chatter is also compressed and muted to give it a sense of the size of the room and the television speaker. Both of these sound constructions serve to create a psychoacoustic gestalt of a living space that is unseen by the camera, and the rapid editing of content implies the presence of a person who is changing channels, perhaps a parent just home from a trip to the toy store who is taking a break from child care. The balance of this pattern of effects creates a heightened sense of cinematic reality, effectively smoothing over the technical wrinkles in the computer-generated animation. Rydstrom reiterates the importance of *Tin Toy*: "I think it's the most sound-intensive movie per square inch that I've ever done" and for Pixar revealed the importance of sound design in "shaping the content of the film" (Paik 2007, 72).

In any discussion of Pixar's house style, it is essential to discuss the role of both music and the voice; however, these topics could merit another chapter entirely. Instead, I briefly explore how Pixar's approach has reshaped the functions of both of these elements to fit their design philosophies. In the 1989 short film *Knick Knack*, director John Lasseter paid homage to Warner Bros.-style cartoons by presenting the story of a snowman who is trapped in a snow globe but is eager to join the frivolity of a shelf full of warm-weather knickknacks. The visual design evokes a "retrovibe" that draws on trends present in "1950s' modernism" (Amidi 2009, 25). However, the music in the film is not orchestral as was traditionally the case in the early Warner Bros. animated films; rather, it features the instrument of a single voice, specifically that of performer Bobby McFerrin. McFerrin, who is perhaps best known for his hit "Don't Worry, Be Happy." He typically employs his entire body in a composition, using his voice to follow the melodic line while employing his chest to beat out the rhythm section and when necessary, using editing and re-recording techniques to fill in the gaps. His vocal style and his technique are akin to animation because they draw on the strategy of anthropomorphism to recast the voice in place of the various orchestral instruments. True to the Pixar's sound style, this composition, which draws on 1950s' bebop becomes an idiosyncratic character within the piece by providing a human rhythm that activates the computer-generated images. Specifically, the various characters, including a cactus, a pyramid, and a pink flamingo, "come alive" and sway to the beat of the music, which is situated as both score and source.

Within the hierarchy of image-sound relations, Pixar's use of music in this short flips the audio paradigm to resemble that of the musical. According to animation historian Scott Curtis, this is a similar strategy engaged by early Warner Bros. cartoon shorts: "Given that the tempo of the music has already been decided upon in any given cartoon [as a result of the music selection], the 'mise-en-scène' enacts that tempo in a variety of ways . . . characters sing and . . . buildings also sway" (Curtis 1992, 200). This acknowledgement of the power of music to drive animation became a factor in the audio and visual design of subsequent shorts, specifically *Boundin'* and *One Man Band*. However, Pixar has staunchly avoided allowing music and the conventions of musical genre to become the sole driving factor of animation in its feature films; rather, it has remained committed to a more blended approach that balances the use of sound design and music in the storytelling process. In this way, the company has distinguished its house style from that of Disney's successful 2-D animated units, which produced musicals like *Beauty and the Beast* (1991) and *Aladdin* (1992). At the end of *Knick Knack*, Lasseter and Rydstrom even draw our attention to the power of a blended approach by offering a transgressive use of "score," which comically comments on the fate of the written word in light of potential computer-generated animation. While the credits roll, a voice reads along, presenting not a recitation of the written text but a rhythmic reading of the phrase "blah blah blah." The use of the phrase is both musical and satirical as it is a playful reference to both the ineffective nature of voice-over and a sense of nostalgia for what many filmgoers might recognize from Peanuts cartoons as

"adult speak," which, like most film credits, is something that fails to hold anyone's attention.

This is not to say that Pixar has given up on speech and language entirely. Rather, the shorts and the Pixar house style eventually do find a place for both, but, once again, the filmmakers rethink their use in light of the particular needs of computer animation as a new film form. Just as Rydstrom's philosophy of hyperrealism borrowed the codes and emotional components of specific sound effects, so Pixar's use of the voice attempts to do the same by borrowing the credibility of celebrity voices to bring its computer-designed characters to life. With the release of the short *Mike's New Car* (2002), Pixar moved the production of their shorts in a new direction by specifically linking them to their feature-length productions through voice casting and character crossover. In this instance, the buddy team of Sully (voiced by John Goodman) and Mike Wazowski (voiced by Billy Crystal) from *Monsters, Inc.* comes together for a test drive of Mike's new vehicle, which not so surprisingly ends in madcap mayhem as the car's gadgetry gets the best of them. The voices bring a star quality that serves as a recognizable anchor for both the production design and the filmgoers. According to animator John Kahrs, "John Goodman's vocal performance was really rich and had a lot of range . . . There is a resonant warble to his voice, almost bear-like, and it fits the character so well. I would get direction from his performance and know exactly how the eyebrows are going to move and what the emotion of the scene is going to be" (*Monsters, Inc.*: Production Notes). By contrast, Billy Crystal established Mike Wazowski with vocal qualities of an East Coast origin, specifically by engaging in fast-talking New York mania, which is incorporated into the physicality of the character through frenetic arm and leg gestures. According to lead character animator Andrew Gordon, "Billy would take a line and go off on lots of tangents with ad-libs and comedy routines" (*Monsters, Inc.*: Production Notes).

The voice itself becomes a kind of special effect, which is much like the image-sound relations found in puppetry. Sound theorist Michel Chion has argued that in the 1970s the nature of the voice in Hollywood cinema changed significantly as filmgoers were made aware of its constructed nature in films like *The Exorcist* (1973) and *Star Wars* (1977), in which the voices seemed "stuck on" to various characters in makeup or masks (Chion 1999, 164–65). Chion makes the connection directly to puppetry: "We're constantly aware that voices are grafted onto bodies, only temporarily on loan" (Chion 1999, 154). Pixar's house style acknowledges this hyperawareness and in fact depends upon the filmgoer's knowledge of these actors' personas, past work, and vocal qualities to lend credibility to their virtual incarnations. Technically, these efforts are further supported by animation software that enhances vocal synchronization in relation to the characters' on-screen facial gestures. As senior animator Peter Docter (director of *Monsters, Inc.*) noted in relation to the voice and animation style on *Toy Story*, "We have a program that enables us to look at a sound wave and break it down into frames. I listened to the sound over and over again, then did an assessment of the pitch of the words" (Street 1995, 85). These cues then became the reference points for facial gestures and body movements,

while "lip-synching was facilitated by a library of mouth poses that could be used to form the various sounds" (Street 195, 87).

This is not to imply that Pixar has allowed the voice to take complete priority in the design process as it might in a live-action film; rather, the vocal design supports the overall filmmaking philosophy and house style. One of the ways in which Pixar achieves this goal is to direct voice talent toward a particular kind of skewed readings. As a result, many of the vocal performances are mannered and caricaturized somewhat with an elastic quality. Billy Crystal's performance is a prime example. His vocal timing and rounded enunciations are presented in fits and starts much like someone learning to drive a stick-shift car. They beg to be animated in the form of a giant green eyeball with a large and expressive mouth, evoking the performance codes of puppetry. Once again, this approach has been formulated somewhat around the limitations of the animation software, which despite years of development still has difficulty rendering the human form.

Pixar has worked around these limitations by embracing a unique style of human character design that focuses on geometric shapes and patterns similar to those found in comic books. This style is evident in the crossover short *Jack-Jack Attack* (2005), directed by Brad Bird (*The Incredibles*). The storyline features another child-care situation, in which preteen Kari (voiced by Bret Parker) must contend with the developing superpowers of Jack-Jack, the offspring of two superheroes. Unlike the baby in *Tin Toy*, Jack-Jack's skin is smooth, and his head is round with a triangular sprig of hair on top. Kari's facial features are similarly variant, with particular emphasis on her elastic mouth and braces. As with Billy Crystal, Kari's vocal performance hinges on idiosyncratic timing from the lethargic to the manic. The comedy resides in the scale of the performance contrasts, which range from the naturalistic to the cartoony. In this way, sound takes on hard edges that match the geometric visuals. Bird notes that, in designing these characters, he strived to make them both "caricatured *and* believable," an approach that "Disney used to call . . . 'the plausible impossible'" (Corliss 2004, 80). In the end, this assessment is an apt description of the overall audiovisual design philosophy and house style of Pixar Animation Studios as it incorporates both an understanding of the animation traditions of the past and a vision of computer-generated animation in the future.

Conclusions

Pixar Animation Studio continues to use the development of short films as a training ground for new producers, directors, animators, and sound designers. Each effort continues to provide the company with valuable research and creative outcomes. Pixar's house style, therefore, is by no means fixed; rather, it continues to develop under the influence of new technologies and personnel. One glimpse of the future, however, may be found in Pixar's support of research on sound synthesis at

Cornell's Department of Computer Science, where computer graphics researchers are developing the equivalent of computer-imaging software for sound. Using physics and software modeling, researchers are simulating the sound of water, rendering noise vibrations, splashes, and even the formulation of bubbles in synchronization with computer-generated images of water provided by Pixar as if both existed in the real world (Steele 2009, 1). If widely implemented, the implications of synthesized-sound software could shift both the production of animation in film and video games radically. For instance, sounds in video games could be programmed for real-time activation and origination, coming from specific on-screen actions or environmental sources rather than from sound files for sound effects and dialogue that are recalled by the program and repeated based on activation points or predetermined gestures. Sound and image could occur in real time, just as they do in the physical world. This approach would strengthen the immersive quality of video games, which has long been one of the primary projects of game development. In animation development, sound and image constructions could be designed together by the same software and designer, a development that could once again lead to a further collapse of duties and hierarchies within the mode of production. Ultimately, the roles of the animator and the sound designer could merge, offering the potential of not only a significant shift in Pixar's house style but also a realignment of the cultural reception and our expectations related to sound and image design in the digital age.

Table 15.1 Online Resources

Cornell Harmonic Fluids Project	http://www.cs.cornell.edu/projects/HarmonicFluids
Digidesign (Pro Tools)	http://www.digidesign.com
Dolby Laboratories	http://www.dolby.com/index.html
FilmSound.org	http://filmsound.org
Pixar Animation Studios	http://www.pixar.com
Pixar's RenderMan	https://renderman.pixar.com
Skywalker Sound	http://www.skysound.com
William Whittington, PhD	http://web.me.com/williamwhittington

NOTE

1 *Foley* is the term given to those effects created on a sound stage in synchronization with the picture. *Ambiences* are layers of background noises, which often form environmental aspects such as busy street noise or waves on a beach.

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