

## IT CAME FROM HOLLYWOOD

*What happens when the top F/X man collaborates with an M.I.T. scientist?*

BY JOHN SEABROOK

The DVD of “Jurassic Park III” comes with an F/X voice-over, in which the special-effects creators talk about their work. If you listen during the first gory sequence in the film, when the Spinosaurus jumps out of the jungle and, shockingly, devours a man in one bite, you will hear Stan Winston’s voice—a gentle, sweet-sounding voice—exclaiming with delight, “I love it when dinos eat people!” He sounds almost moved. Dinosaurs provide Winston with an opportunity to evoke the ancient, hardwired horror of being eaten alive, as well as with a chance to display the disgusting remains of humans after the beasts have finished with them. For a creature-maker, it doesn’t get much better than that.

Now fifty-seven, Winston has, during thirty-five years in the movie business, almost single-handedly elevated the craft of creature-making from the somewhat comical man-in-a-rubber-suit monsters of the nineteen-fifties and sixties to animatronics—electronically animated, part-robot, part-puppet creatures that have terrified millions of moviegoers. He won his first Oscar for James Cameron’s 1986 film “Aliens,” of which the most spectacular creature was the Alien Queen—a fourteen-foot-high, crustacean-necked monster with a shiny cockroach carapace, yellow acid for blood, and two jaws full of mucus-smeared, razor-sharp teeth. (Before becoming a creature-maker, Winston studied to be a dentist.) He won his second and third Oscars for Cameron’s second “Terminator” movie (1991), for makeup and visual effects, and his fourth for Steven Spielberg’s “Jurassic Park” (1993), for which Winston created, among other effects, robotic velociraptors and a forty-foot-long Tyrannosaurus rex, with hydraulically driven limbs and radio-controlled dilating eyes. His dinosaurs got better with each sequel, even if the movies didn’t.

Winston’s success has coincided with the rise of computer graphics, or CG—a technology that allows F/X artists to

make monsters entirely out of pixels, greatly expanding the range of possibilities. Yet CG monsters rarely seem as scary as Winston’s mechanical monsters, in large part because they aren’t filmed in live-action sequences with the actors but are added to the film during postproduction. “When you come to the set,” Steven Spielberg told me, “and there’s a thirty-

pain and fear which probably would have served him well as a dentist. Directors like to work with him, Cameron says, because “Stan has never lost the love of putting on a show; he’ll get all excited, saying, ‘This is going to scare the crap out of people,’ and he infects you with his enthusiasm.” When I asked Winston about this one day—how can a guy who has scared so many people be so likable?—he said, “I hope I’m likable as a human being, but I do love to scare people. People like being scared. I’ll tell you something, it’s the people who don’t go to scary movies who have nightmares. What I do is I allow them to get their fears out in the movie theatre so they don’t have to be scared at home.”

Stan Winston Studio—a full-service



*Leonardo, unlike Stan Winston's other creations, could one day have “robot emotions.”*

six-foot-high creature there, waiting to perform with the actors, it’s inspiring—to all of us. If you make creatures only on the computer, it takes the fun out of it.”

Nothing about Stan Winston seems monstrous. White-haired and bearded, he is slight of build, and has a soothing way of talking about creating

special-effects shop, of which Winston is both the owner and the head artist—is a thirty-five-thousand-square-foot industrial space in the San Fernando Valley. In addition to making creatures for movies and television (these include appealing characters, like the duck in the Aflac insurance commercial, with its Chaplinesque walk, and the grumpy old

TOMER HANUKA



*"It's not a shawl, hombre—it's a hand-woven poncho."*

frogs created for a series of Budweiser commercials), Winston produces a line of monster toys, and is in the process of creating a new Horror Channel, featuring twenty-four-hour horror on cable. Winston and his wife of thirty-four years, Karen, live in Malibu, and he has his choice of a Hummer, two Harleys, a Ferrari, or a turbo-charged Porsche to make the drive to work.

The large workspace on the ground floor is full of the smells of creature-making—silicon, urethane, latex, glue. Scattered on worktables are arms and legs, some human, some animal. People are drawing, painting, sculpting, engineering, and wiring. Winston mostly manages his artists, several of whom have been with him for twenty years, though he occasionally sketches and sculpts. Some of his artists use computers to design the creatures, but Winston is proudly computer-illiterate.

Also downstairs is a diorama of the great Stan Winston monsters, displayed in a big, dimly lit conference room, with spotlights on the creatures. Here are Winston's takes on the mythic horrors—fire-breathing dragons, ogres, the Minotaur, the Harpies—that have been interpreted in art and literature for the past ten thousand years and reinterpreted, for the

past century, in film. Winston's *Predator*, from the 1987 film by John McTiernan, refers to movie monsters such as the She-Creature, from 1956, which, in turn, harks back to Grendel, the monster in "Beowulf." But the *Predator*'s Rastafarian-looking quills and his fearsome mandibles made the horror fresh. Frankenstein, imagined by Mary Shelley, in 1818, was a myth of modern hubris going back to Adam and Eve. It was made a modern classic in the 1931 Universal film starring Boris Karloff. That Frankenstein image was unsurpassed until James Cameron came to Winston with his idea for the Terminator.

Upstairs, some of Winston's serious art work is on display, including a life-size, hyperrealist bronze sculpture of Arnold Schwarzenegger's head, each bone and muscle precisely rendered. Winston gave the original sculpture to his good friend the Governor for his fiftieth birthday, several years ago. (The idea to do these kinds of sculptures, Winston told me, came from another pal, the actor Rod Steiger, almost twenty years ago. "Steiger said, 'Do something serious.' As if making monsters wasn't serious. So I did a classic sculpture so that people could see that the monster-maker is also an artist.")

Winston casts himself alternately as

a businessman and as an artist, swinging between pride and humility. He says, of his F/X atelier, "I have the greatest artists in the world working for me. The people here are the equals of the Renaissance artists of five hundred years ago. Michelangelo—what did he do? He created fantasies—gargoyles, images of Hell, demons, angels. Just like us. Or look at a great painting like 'The Raft of the Medusa'—it's horrific! That parallels what we do." And, he goes on, although making monsters does not rank high in the art world's hierarchy, "I guarantee you that long after the painting the snobs say is art—the painting and sculpture in the galleries—is forgotten, the face of the Terminator will be remembered." But soon Winston will retreat from those remarks, and assure you that he is just a monster-maker after all.

As an adolescent in Arlington, Virginia, Winston wrote and directed his own scary movies, which he shot on an 8-mm. movie camera. His parents, who were in the garment business (Stan's family changed the name from Weinstein), wanted their son to be a lawyer or a doctor, but after two years of "pre-ident," at the University of Virginia, Stan became an art major. "My parents' jaws dropped, but I had to let the artist inside me out," he said. "But I always had the businessman saying, 'O.K., Stan, indulge your passion for art, but how are you going to make a living at it?'"

Winston came to Hollywood in 1968, planning to be an actor. "Actually, I wanted to be a star, which is why I failed as an actor," he told me. While he was in Southern California, waiting for the acting jobs that never arrived, Winston decided to learn the trade of theatrical makeup at Walt Disney Studios. After graduating, he quickly began to get work in television. He did the makeup for "Roots," and he aged Cicely Tyson some ninety years for her role in "The Autobiography of Miss Jane Pittman," for which he won an Emmy. In 1977, he went to New York, where Sidney Lumet was filming "The Wiz." (When Winston joined the cast and crew and "they saw that the black-makeup guy was this little Jewish white kid, they were stunned," he said.) Winston did the metallic makeup for the Tin Man and the mechanically articulated faces of the flying monkeys. He was then asked to work on "Heartbeeps," which featured Ber-



nadette Peters and Andy Kaufman as robots. "After that, I was no longer the black-makeup guy, I was the robot guy."

In the early nineteen-eighties, Winston met a young director named James Cameron, who had a script for a film called "The Terminator." Cameron had a backer, a star in Schwarzenegger, and a character who was about to become one of the all-time great monsters in movies. Cameron had made several paintings of the monster he imagined—a face that was a nightmarish melding of man and machine, with part of the flesh stripped away, showing the gleaming metal underneath. In Cameron's vision, the face would deteriorate throughout the movie, until finally all the flesh was burned away to reveal an entire steel endoskeleton. Computer graphics—the technology that was used to create the morphing T-1000 in Cameron's "Terminator 2"—did not yet exist. To create a monstrous robot, Cameron had either to put a man in a suit or to use stop-motion animation—scale-model figures that are shot one frame at a time—which F/X artists had been using since the great Ray Harryhausen films of the fifties and sixties, like "Jason and the Argonauts." But movie audiences had grown used to stop-motion animation in the intervening years, and the effects no longer looked as convincing.

"Technically, I didn't want the robot to look like a man in a suit, because the Terminator was a robot inside a man—a robot with flesh," Cameron told me. "We could not accomplish that visual by putting the robot outside a human form, then trying to imagine that it was also inside. It just wouldn't work. But nobody had ever created a robot that wasn't a suit." Cameron asked other directors if they knew of a makeup artist who could achieve the kind of effect he had in mind, and he soon heard about the robot guy. Cameron said, "I went to Stan with my drawings, and said, 'This is what I want the Terminator to look like. I don't know how to build it, but it's got to look like this.'" Winston altered the traditional man-in-a-suit formula—he made a mask out of Arnold Schwarzenegger's face, and cut part of it away to reveal mechanized-looking makeup underneath, which was applied to the actor's face. When Winston heard that Cameron

was planning to shoot the endoskeleton scenes in stop-motion animation, he said, "Why don't you let us build you a full-size animatronic puppet—a robot, essentially, that would play the robot—and you can then shoot that sequence in live action?"

Cameron let him, and for "Terminator 2" Winston built an even more sophisticated robotic endoskeleton, which you see early in the movie, crunching a human skull under its steel foot. Winston's shop also designed scores of other effects, including the unforgettable image of the villain, Robert Patrick, his torso cleaved in two by a metal bar.

When Steven Spielberg collaborates with Winston, he sends the screenplay to Winston and then goes to see him. "Stan listens very intensely, until he gets the director's vision," Spielberg told me. "I swear, he must be the first Method monster man. He'll assume the creature's body position, make roars, do the facial expressions—trying to figure out how the creature is going to project the emotion you're going for."

Winston says, "We are all extremely attuned to certain expressions, and I think we understand character by a certain look—that sidelong glance that shows you the way we really feel." When designing a creature's face, he explained, "I sit in front of a mirror making faces." He imagines the emotion that the creature is feeling in a particular situation, watching for the distinctive twist of the eyebrow or the cruel curl of the lip in his own face, and then draws it.

After the creature's face and body have been designed in two dimensions, a three-dimensional model is created. At this stage, all the creature's cosmetic elements—color, hair, skin tone—are selected. Sometimes, if puppetry is part of the plan, Winston's staff of puppeteers begin practicing with the creature, at times wearing "gypsy suits"—full-body controls that allow the puppeteers to manipulate the creature's features. In many cases, a single creature is performed by multiple puppeteers—one for the ears, one for the eyebrows, one for the hands, one for the legs—who must all learn to work together so that the creature's movements are fluid and lifelike. (When an animatronic doesn't move

smoothly, the F/X artists in Winston's shop say it has the "wagga waggas.")

As Winston sees it, his job, after making sure that his creatures perform correctly, is to get the strongest possible performances out of the actors, and that often means terrifying them. "CG can't do that. How can you possibly get the best performance out of an actor when the thing he's acting with isn't there? Can't be done." The Spinosaurus in "Jurassic Park III," for example, was a twenty-five-thousand-pound robot driven by a thousand-horsepower engine. "That robot could easily have killed someone," Winston told me excitedly.

The one aspect of making lifelike creatures which no F/X artist has yet mastered is "eye line"—a creature's ability to maintain eye contact with an actor and to track movements. "You've got multiple puppet operators moving the eyes, head, and neck," Winston said, explaining why eye line is impossible. "So if any one of them moves the head in a way that's slightly out of synch with the others, the eyes don't stay on the actor." If you could design eye line into robots, puppets, and animatronics, Winston believes, it would be a breakthrough in creature-making.

During his career, Winston has become a master creator of a certain kind of artificial life. It's not a scientific endeavor, like the pursuit of artificial intelligence launched at M.I.T., in the nineteen-fifties, by a group of researchers, including Marvin Minsky and Seymour Papert, with the lofty ambition of creating machines that think like people. Winston belongs to the older tradition of "automatons," which, as described by Gaby Wood in her recent book, "Edison's Eve," goes back more than two centuries, to a famous mechanical duck built by the French engineer Jacques de Vaucanson in the seventeen-thirties. The duck could flap its wings, eat, and, most remarkably, defecate. (Voltaire observed, as Wood relates, that without the shitting duck there would be nothing to remind us of the glory of France.) The purpose of the duck, and other similar automatons, was spectacle and illusion, not science and technology.

These two notions of artificial life, the modern and the classical, came together in Spielberg's 2001 film, "A.I." In order to create the illusion that robots really could look and talk like people, Winston built



nearly a dozen animatronic puppets. Teddy, the talking and walking “super toy,” was just a superior mechanical duck—a puppet who needed five, sometimes six, puppeteers to bring him to life—but within the movie he appeared incredibly real, and gave one of the most compelling performances in the film.

In the summer of 2001, just before the release of “A.I.,” a young computer scientist at the M.I.T. Media Lab, Cynthia Breazeal, visited Winston. For her doctorate, Breazeal had built a “social robot,” Kismet, which had a cartoonish, humanoid face that could imitate human facial expressions. When you praised the robot, it smiled back; if you looked angry, it looked sad. Kismet and Breazeal were widely covered in the science press, and often pictured together—an attractive young woman with dark hair and eyebrows and high cheekbones, and a robot with glued-on false eyelashes from a beauty-supply store, fur for eyebrows, and surgical tubing colored in with a red pen for lips. Kathleen Kennedy, the producer of “A.I.,” had seen a story about Breazeal in *Time*, and flown her to Los Angeles to brief Spielberg on robots and artificial-intelligence research, in preparation for doing press about the film.

Breazeal had a proposal for Winston. “She said, ‘How would you like to build a real Teddy, a Teddy with a brain?’” he recalled. “Would I consider collaborating and sharing technology with M.I.T. and

creating the real thing?” Stan Winston Studio would fund and produce the design and construction of the robot, and M.I.T. would supply the “brain”: software that would allow the robot to see, hear, speak, and feel. Unlike Winston’s creatures, this robot would be autonomous, its movements controlled not by puppeteers wearing suits or by operators working radio controls but by an internal mechanical system driven by its own software, and the software would give it the ability to maintain eye line. Breazeal would get a robot with a face capable of expressing the subtle cognitive processes embedded in its software; Winston would get a puppet without strings. Intellectually, their creature would, on its father’s side, be descended from the classical world of automata, and, on its mother’s side, from the modern world of artificial intelligence. It would, in short, be the most lifelike mechanical creature ever built, a state-of-the-art emotional machine.

“I had to think about her offer for two seconds,” Winston recalled, “and then I said, ‘Of course I’m going to do this.’”

Early in their collaboration, in the spring of 2002, Winston and Breazeal selected a name: Leonardo, “because this creature represents the ideal collaboration of art and science—an artist and a scientist working together to create something real,” Winston said. Then, in Los Angeles, Winston went to work on

Leo’s body and face. One of the few guidelines from Breazeal was that Leo not look too human, lest he fall into the “uncanny valley,” a concept formulated by Masahiro Mori, a Japanese roboticist. Mori tested people’s emotional responses to a wide variety of robots, from non-humanoid to completely humanoid. He found that the human tendency to empathize with machines increases as the robot becomes more human. But at a certain point, when the robot becomes *too* human, the emotional sympathy abruptly ceases, and revulsion takes its place. People began to notice not the charmingly human characteristics of the robot but the creepy zombielike differences.

Leonardo was built alongside Winston’s other projects, including the robots he did for “Terminator 3” and the animals he was making for Tim Burton’s new movie, “Big Fish.” Winston wanted to design a creature that was almost compulsively lovable, but the principles that informed Leonardo’s design were the same as those used to make monsters. “There are certain universal facial characteristics that are known to trigger a particular kind of response in people,” Winston explained to me. (Many of these principles were codified at the Disney Studios in the nineteen-thirties and forties, by the animators who created films like “Pinocchio” and “Dumbo” and “Fantasia.”) “Big eyes, a head that is bigger than a body, a cute mouth, and a pug nose are considered lovable everywhere.”

Lindsay Macgowan, a “rendering artist” on Winston’s staff who had helped design Teddy, drew the first sketches. Leo looked a little like a Gremlin, from the 1981 Spielberg movie, and also something like one of George Lucas’s Ewoks. He had collie ears, a cougarlike snout, four-fingered hands, a round, cartoonish belly, and, most uncannily, a human tongue and teeth. He stood two and a half feet tall, with three-toed feet, and was entirely covered with thick, soft fur made mostly of mohair and the tail hair of yaks, and hand-stitched into the skin, one strand at a time. His eyes and brows were youthful in appearance, but he had an old creature’s hands, with lots of wrinkles around the knuckles.

Some of the aesthetic decisions about the creature’s design were made with Leonardo’s mechanical requirements in mind. The large head and the potbelly would allow more room for the motors,



*“The innocence seems forced.”*

gears, cables, pulleys, and gimbals that constituted Leonardo's muscles. Big eyes, in addition to being adorable, would let more light in for the cameras, and the pettable ears would channel sound down to the microphones in the head.

As Winston and his staff worked on Leonardo's body, Breazeal and her students at M.I.T. were working on his brain—assembling the software that would make the robot capable of speech recognition and synthesis, visualization, and basic cognitive skills. The work entailed adapting software written at M.I.T. over a period of many years, and writing new bits of code tailored to Leo's requirements.

Breazeal grew up in California, where her parents were computer scientists. She majored in electrical and computer engineering at the University of California at Santa Barbara. (She also surfs.) After graduating, she went to M.I.T., to study under Rodney Brooks, the head of the Artificial Intelligence Laboratory, and one of the world's experts on autonomous robots. Brooks was trying to steer A.I. away from the absolutist goals of its founders and toward the more modest but reasonable aims of applied robotics. Breazeal built a rover with Brooks, and also worked on a primitive humanoid robot named Cog.

Some of Breazeal's ideas correspond with those of Donald Norman, a professor of computer science and psychology at Northwestern University and an influential writer on technological design. In his forthcoming book, "Emotional Design," Norman argues that emotions play as important a part in intelligence as does cognition. Emotions do the work of judging, he says, while cognition does the work of understanding, but both kinds of thinking are necessary. "Our emotions protect us, guide us, make us inquisitive," he told me. "Robots will need the same kind of equipment so that they can learn about their environment, and how to get along in it." And robots need to display their emotions, Norman added, so that humans will be able to tell at a glance what's going on inside them.

I asked Breazeal whether she viewed her association with Hollywood as a kind of devil's bargain—in getting Leo's body and face from Hollywood, she was trading the world of science for the world of illusion. Breazeal pointed out that Holly-

wood has created many famous screen robots, from the Deco metal woman in Fritz Lang's "Metropolis" to Robby the Robot in "Forbidden Planet," and from Hal in "2001," on which Marvin Minsky was a consultant (Hal was totally disembodied, the opposite of Breazeal's robots), to the Terminator. Breazeal herself first became interested in robots in 1977, when she was eight, and her parents took her to see "Star Wars," which featured the droids R2-D2 and C-3PO.

But while Hollywood robots may have sparked the general public's interest in thinking machines, and in some cases influenced scientists themselves, you're still watching a man in a suit, or a hunk of painted fiberglass masquerading as a complicated piece of electronic equipment, created not by scientists but by a "robot guy." Breazeal, however, saw her collaboration with Winston in less rigid terms: "Our approach to doing design is what I call bootstrapping—create robots for real-world applications, and then improve them based on how they perform."

Working with Winston to build a lovable robot, Breazeal believes, will help her to design robots that could eventually become human companions. "If you look at the statistics here, and even more so in Japan, in twenty years there are going to be too many elderly people who need care, and there won't be enough nurses or family members to take care of them," she said. "The solution could be a sociable robot, something that lives with you and that you can have a meaningful emotional interaction with."

In the summer of 2003, the creature came East, to Breazeal's lab, on the M.I.T. campus, in Cambridge. Work on his brain continued, and Breazeal and her graduate students began training Leo to track objects with his eyes. In late August, Winston arrived for a demonstration, and I arranged to join him while he was in Boston.

On the morning of the demonstration, Leo sat on his metal base, with his eyes open, staring dully at a Tickle Me Elmo doll. When one of the students moved Elmo, the robot's eyes moved, too, tracking it. There was a computer-generated Leonardo playing on a laptop in the lab, showing what the creature will look like one day, but that day did not appear to be imminent. Leo's expression was listless,

and his appearance was somewhat dishevelled—his ears had fur on them, but the rest of his fiberglass body was bare. (His yak coat was still in L.A.) The robot's facial expressions and body movements weren't being operated yet, although one of the students was moving his arms, using a gypsy suit. But the suit was a cheap one, and the student wasn't very skillful. Leo had a bad case of the wagga waggas.

Afterward, I brought up something that Marvin Minsky had said to me the day before, when I asked him for his thoughts about Leonardo. Minsky had said, "My objection to Leonardo is, it's just a trick. It doesn't really have emotions. It just knows how to fool you into thinking it does. Cynthia's an excellent engineer, but her work doesn't explain how emotions work. Leonardo is just an improved version of that software wizard, F1, that Microsoft tried to get people to buy a few years ago. People went, 'Oh, gee, that's neat,' for a couple of days, and then they got tired of it." In Minsky's view, Leonardo was more Hollywood than M.I.T.

"Shame on Marvin Minsky!" Winston declared dramatically when he had heard Minsky's views.

Breazeal, however, looked a bit taken aback. She said, "Well, I don't see Leonardo's emotions as being a trick. They serve a useful function for the robot. We're not trying to capture the human-feeling side of emotions, but we are trying to capture the pragmatic side—communicating with others and behaving more intelligently. If robots are going to have emotions, they're going to have robot emotions."

"And what is trick and what is real?" Winston added. "If you go to a film, a love story, and what you see on the screen makes you cry—isn't that a real emotion?" He leaned back in his chair and folded his arms confidently. "Let's say you tell me a joke and I laugh at it. Am I laughing because I think in my soul your joke is funny, or because I'm programmed to do it—I want to make you feel good, because that then validates me? The point is, you can't know; I can't know. But the robot will be more honest—he won't laugh at my joke unless it's funny."

Building Leonardo had cost Winston almost a million dollars so far. (The creature's coat alone was tens of thousands of dollars.) "At first, it wasn't



about the bottom line, it was about let's do something no one has ever done before," Winston told me. "But then my practical side started saying, 'O.K., Stan, this is cool, but what can I derive from this that's good for my business?'"

The most obvious application was a new generation of animatronic puppets, produced exclusively by Stan Winston Studio, that could lock eyes with actors. But, more important, Stan Winston Studio would own the character of Leonardo. Directors generally have creative control of a creature while a film is in production, and the character rights are the property of the studio backing the film. The creature-maker, who, of all the artists involved in creating a film, comes closest to the primal act of creation, doesn't own his own creature. But Stan Winston is the auteur of Leo.

Winston hopes to make his creature a star. "I can envision a story written with Leonardo in it, and a movie with him as the main character—a wonderful, folksy, Disneyesque PG story that is all about him," Winston said.

Judging by the latest reports from Breazeal's lab, the creature is making progress toward that goal: he can nod, cock his head quizzically when he's confused, and blink almost flirtatiously.

I asked Winston whether Leo could be a monster.

"I don't think so," he said. "But anything's possible. I'll say this. He could be scary. You'll have an animatronic puppet actor that will never take his eyes off you. How scary is that?" ♦

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#### CORRECTION OF THE WEEK

*From the Times.*

An obituary last Wednesday about Marvin Smith, a leading photographer of Harlem who worked with his identical twin, Morgan, described the closeness of the two men—it was said that they never used the pronoun "I"—and recounted an anecdote about Marvin Smith's response to the illness that caused his brother's death, in 1993.

The article said that Morgan Smith died of testicular cancer and that his brother, in response, had his own testicles removed. That account was given to The Times by a friend of both men. It should not have been published unless it could be verified and attributed.

After the obituary appeared, Monica Smith, the daughter of Morgan Smith, told The Times that her father had had prostate cancer and that her uncle did not have his testicles removed.