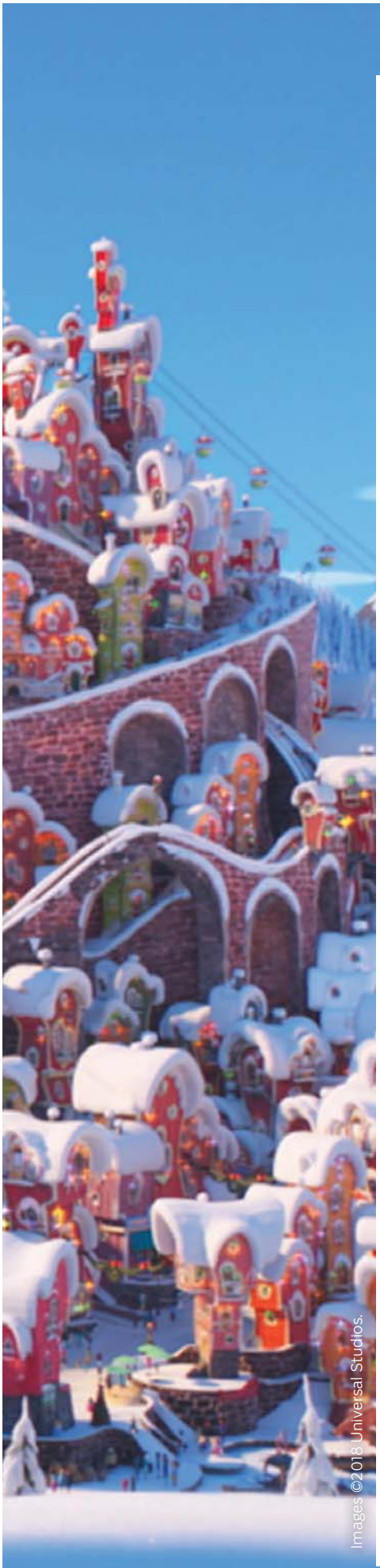


Spoiler Alert!

ILLUMINATION ARTISTS TRANSFORM THE STORY OF THE GRINCH WHO STOLE CHRISTMAS INTO A FULL-LENGTH CG FEATURE FILM

BY KAREN MOLTENBREY

When Chris Meledandri set out to create the CG animated feature *The Grinch* based on the popular holiday tale, his artists and animators at Illumination went by the book – Dr. Seuss' children's book "How the Grinch Stole Christmas!," that is.

Meledandri and his longtime co-producer, Janet Healy, along with his talented crew at Illumination, were heading into familiar territory for this project. First, they have found great success with endearing antisocial-like characters via their *Despicable Me* franchise. Second, they were breathing new life into a well-known story that started with a book in the late '50s, followed by a traditionally animated TV special that still airs yearly during the Christmas season, and, later, by a live-action film. In addition, this project marks Illumination founder/CEO Meledandri's third go at adapting the uniquely styled Seuss books into CG features (2008's *Horton Hears a Who!* while at Fox and 2012's *The Lorax* at Illumination).

On the other hand, they would have the daunting task of expanding a 69-page book filled with unique visuals and rhyming verse. "I grew up with the wonderful Chuck Jones [TV special]. That design was so wonderful. We didn't want to just do an iteration of that. So, we went back to the book and used that as the starting point, the DNA, of how we would expand the story," says Yarrow Cheney, who co-directed *The Grinch* along with Scott Mosier.

Every Who Down in Whoville Liked Christmas a lot...But the Grinch, Who lived just north of Whoville, Did NOT!

Illumination expanded on the Dr. Seuss design language for the characters, locations, and main story points: The people of Whoville embrace and celebrate the spirit, joy, and togetherness of the holiday season, but Grinch, who lives atop Mt. Crumpet outside of the town, detests the holiday and everything associated with it, and enlists the help of his loyal dog, Max, to steal the Whos' presents and decorations, and quell the holiday spirit in Whoville once and for all.

For the feature-length *Grinch*, the filmmakers extended what was essentially a one-act play into a three-act structure, delving deeper into some characters, especially Grinch and his backstory, while retaining the book's timeless elements. In the film, Grinch (Benedict Cumberbatch) is a complex character, more mischievous and cranky than cruel. He lives in isolation with his best friend, a dog named Max, but he does see the townsfolk time to time when he has to venture into Whoville for supplies. Like every year, Christmastime strikes a nerve with him, and when he learns that the Whos are planning a bigger,

brighter, and louder celebration this year, well, he reaches his breaking point and hatches a plan to steal Christmas.

Of course, an expanded story means more characters and environments that are new to the tale while seamlessly fitting within the original world. "We set out to create the most spectacular sort of Seuss-like world," says Mosier. We visit inside Grinch's expansive cave, complete with its Seussian-like inventions. We are introduced to Bricklebaum (Kenan Thompson), Grinch's perpetually cheery neighbor who resides at the bottom of the mountain, and Fred, a portly, lackadaisical reindeer that Grinch needs to pull his getaway sleigh. Meanwhile, the tiny hamlet of Whoville has been turned into a bustling city filled with shops and restaurants, a town square, and so forth – a place viewers would want to visit, Mosier adds.

And, we learn more about the Whos – inhabitants with real-life struggles. Take Cindy-Lou (Cameron Seely), whose role has been extended far beyond her previous few minutes on Christmas Eve. In this version, she is still a child, but now older than a toddler "not more than two." She and her friends plan to corner Santa as he makes his rounds and ask him not for more toys, but to help her overworked, single mother, Donna.

"It was time to bring this story back for a new generation and for people who have loved it for years and years," Mosier says. "I was excited and terrified all at the same time, though. This is the kind of thing you cannot screw up."

In a nutshell, they had to keep the tale relevant for a new, modern audience, while maintaining the essence of what made it a beloved classic. That involved translating the visual style of the book's drawings using cutting-edge computer graphics – no simple task. However, Illumination embraced the challenge, immersing viewers in this unique world while giving it an Illuminationesque-Seussian aesthetic.

"Stylistically, we tried to honor the source material and take all of that wonderful stylization and apply it to a three-dimensional world where you really feel immersed," says Cheney. "We wanted you to almost feel the snow crunch under your feet and smell the waffles at the waffle stand. We wanted to evoke all the good things about the holidays that we can all relate to."

Characters Big and Small

The artists used a combination of commercial and proprietary software to create the film's CG characters, including Autodesk's Maya along with Pixologic's ZBrush for modeling, Maya for animation, in-house software for rendering and lighting, and Foundry's Nuke for compositing.

When designing the unique characters, the artists avoided using straight lines, according to Meledandri. "Everywhere we could replace a straight line with a curve, we did, because these were motifs from [Dr. Seuss'] work," he adds.

Illumination's films are stylized but grounded in reality, enabling a full range of emotion for the characters. "Our goal isn't to simulate real life; it is to make things feel real while also supporting the stylization and performance aspects in the scenes," explains Cheney. "We try to capture emotion and subtlety when the scene calls for it, but we don't hold back when there is opportunity for fun and humor. When the Grinch tries to steal Christmas, the team went more broad, a bit more cartoony with his motions and physics."

> Then he slid down the chimney. A rather tight pinch. But, if Santa could do it, then so could the Grinch.

The characters have rather basic shapes, but their rigs are more complex in order to achieve a wide range of emotion through an entire physical performance, not just with facial expressions. According to Bruno Chauffard, CG supervisor, the animators started with a generic rig that is already fairly extensive, then pushed it rather strongly in terms of elasticity to meet the animation director's requests.

CINDY-LOU WHO AND HER FRIENDS PLAN TO TRAP SANTA, BUT HAVE GOOD INTENTIONS.

"[The characters] should be able to emote and support an emotional idea from any pose we put them in," adds Cheney. "At the same time, we are doing a Seuss film with a very elegant, stylized feel that permeates everything. To do that, you cannot take control away from the animator. You actually have to give them *more* control over the silhouette. Sometimes you need to bend things that don't naturally bend in order to have a line on a silhouette be elegant."

The silhouette of Grinch in the movie is the same as it is in the book and the TV special. In traditional animation, this is easy to do by drawing lines and poses that aren't necessarily realistic in order to convey a certain attitude or emotion. But in 3D, that's more difficult, since CGI follows certain rules.

"For this film, more than others, we need the artistry that goes into the poses," adds Cheney.

THE GRINCH GOT A WONDERFUL, AWFUL IDEA! I know just what to do! The Grinch laughed in his throat. And he made a quick Santy Claus hat and a coat.

In Cheney's opinion, Grinch was the most technically challenging character in the film. Moreover, he has a number of costumes, but the Santa-disguised Grinch required some complex simulations to make sure his beard behaved realistically through extreme deformations. In addition, his telescopic shoes had to expand to huge proportions, deform extensively, and then fit back into his shoes within a single shot.

Moreover, Grinch has the biggest role, experiences just about every emotion, and is covered head to toe in fur that had to feel like a Dr. Seuss drawing. "There's a style Dr. Seuss used in his illustrations that we tried to incorporate into the shapes of the fur as well as his overall design and his face," Cheney says. "The artists had to make the fur on his face fall downward to look natural, but the tuft at the top of his head... it has a very iconic shape; it points up and out. And, it had to look and react naturally in the wind and snow."

Once the artists captured the silhouette for Grinch and the other characters, it became a matter of defining the details, which are a little bit different in CGI, especially the fur, Mosier points out.

According to Chauffard, the group used numerous texture maps to precisely drive every attribute of the studio's hair systems (length, density, clumping, noise, curliness). For Grinch, they mixed as many as a dozen types of hair for the final result.

To make it Seuss-like, the artists

GRINCH AND HIS REINDEER.

GRINCH WITH HIS LOOT AFTER MAKING HIS ROUNDS IN TOWN.

formed the hair to accentuate the lines and poses used in the drawings, and that had to be incorporated into the character rigs. A studio-developed system enabled the animators to preview the hair behavior interactively when manipulating Grinch so they could anticipate any hair behavioral issues early in the process. "We also developed a way to dynamically instance and animate objects within the fur systems, allowing us to simulate snow getting mixed with the characters' hair and fur," says Chauffard.

In addition to the main characters, there are crowds of Whos created with a mix-and-match modeling system to generate a wide variety of looks. Then, once the crowd was distributed and the animation cycles randomized, the group focused on specific areas of the crowd and updated those with specific keyframe animation to create secondary story lines occurring in the background.

Extreme Environments

There are essentially two big locations in the film: Mt. Crumpet-Grinch's cave and Whoville, but within those locales, particularly Whoville, are many smaller but more intricate indoor and outdoor sets. So, it comes as no surprise that the most ambitious part of the film involved the creation of Whoville, which the artists transformed from line drawings of a handful of snow-covered houses into a brightly-colored, three-dimensional city with teetering, swerving buildings of Seussian style. The Whos are welcoming and warm, so their town needed to reflect this in the shapes and textures of their homes, shops, and vehicles, says Mosier. Thus, the artists embraced a warm, saturated, bright, happy color palette. In fact, Whoville is in direct contrast aesthetically to the Grinch's icy cave on the very angular and lonely Mt. Crumpit.

Using Maya, ZBrush, Foundry's Mari, and Allegorithmic's Substance Painter, the artists built an entire 3D model of the city that the camera could move through without limitation, making sure the layout followed real-world logic. "We know every location — where Cindy-Lou's house is compared to the town square, compared to the entrance to the city and the Who Foods Market," Cheney says. "If you wanted to, you could actually build a real-life Whoville and it would make sense as a town."

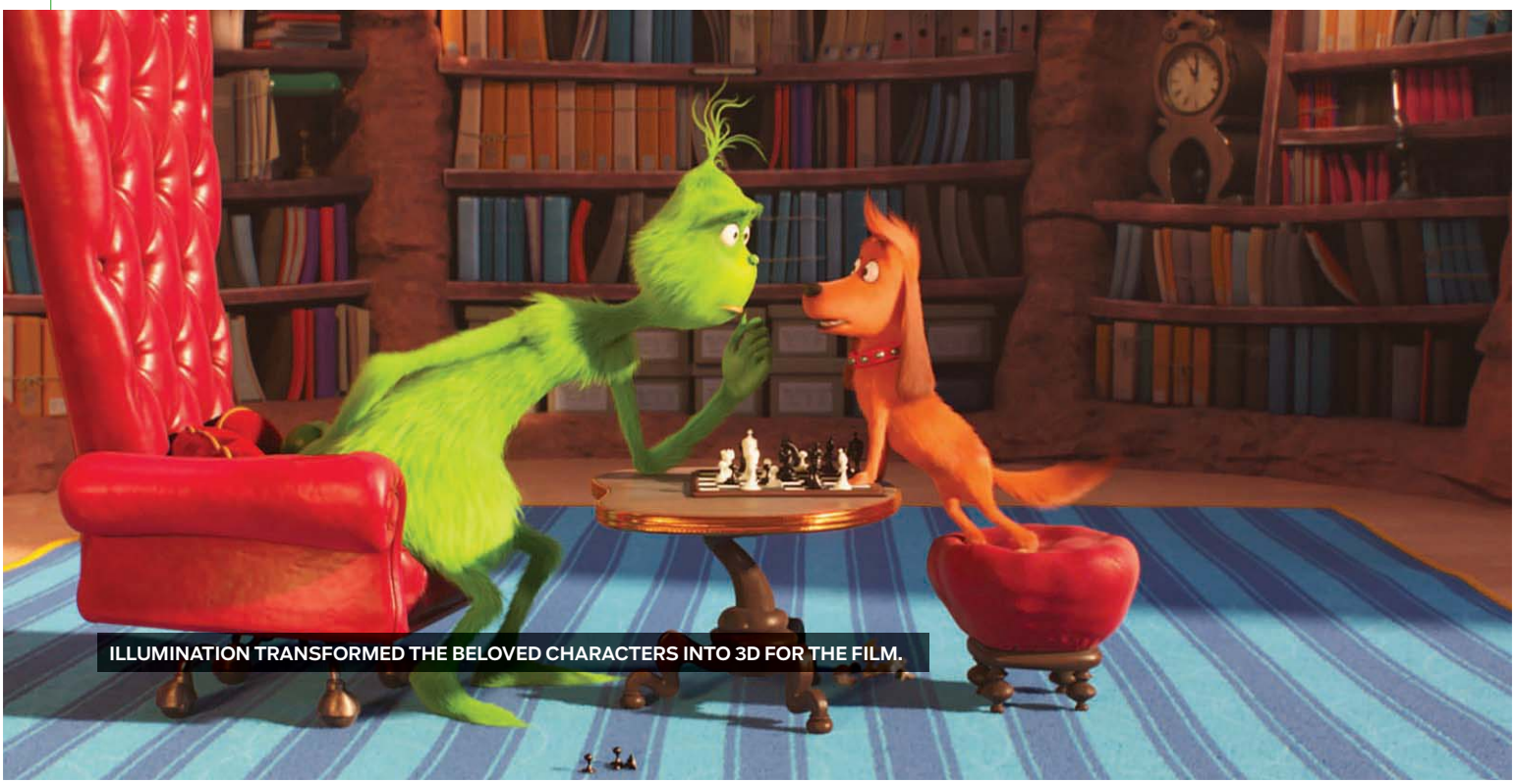
Within the city lies the imaginative world of Dr. Seuss, which is very specific, organic, and uneven, making the fabrication of the designs rather difficult to standardize, says Chauffard. "Each house and store has a specific shape, which was never straight, and that influenced every sub-element such as windows, balconies, and doors," he says. Nevertheless, the crew managed to build a library of elements that they could slightly reshape and adapt to dress the different buildings. Once the buildings were assembled, the artists could procedurally regenerate the textures to fit the new shapes they had created.

> For he knew every Who down in Whoville beneath, Was busy now, hanging a mistletoe wreath.

Whoville is not solely a Christmas town; it is a village that just happens to do Christmas in a big way. As for the artists, they, too, had to decorate the virtual city and embrace the season. For this, they developed a tool that enabled them to grab geometry from a prebuilt library and snap it automatically on the houses and shops, before tweaking it by hand.

As Chauffard notes, the garland bulbs were procedurally generated along curves and volumes. Every bulb carried specific attributes that enabled the artists to drive their color and intensity so they could art-direct their look until late in the process and feed them with complex animation if necessary. "We carefully fine-tuned the rendering and animation of those lights, as they were essential in the evocation of the Christmas spirit through the film," he adds.

The other main environment is Grinch's



ILLUMINATION TRANSFORMED THE BELOVED CHARACTERS INTO 3D FOR THE FILM.

cave, no longer a dark, lonely space, but rather a multi-level lair with big, inviting rooms and packed with hi-tech gadgets and gizmos.

Scattered throughout the alpine mountain and valley is snow – a difficult effect anyway, but in this movie, it is everywhere, covering every surface, including the furred characters, who are often seen wearing fuzzy sweaters.

"The Whos all have fur, and their furry sweaters have a fuzzy texture. There are all these different technical aspects that are difficult, and then you throw snow on top of everything outdoors, and there's a huge leap in technical difficulty," says Cheney. "The 3D surfaces are not typical; with even the hard surfaces, everything is displaced. All the shop fronts and signs... everything you see is not just a typical texture on a plane. Everything has an extra level of complexity, and it's all complexity that has to interact with one another."

The studio developed specific tool kits based on Houdini's Grains Solver that enabled the artists to fine-tune the different aspects of the snow – icy, slushy, crusty – depending on the context. They also developed procedures to automatically generate secondary animation involving the snow. On the rendering side, the snow objects were partially transparent geometries filled with volumetric shaders. Those objects were detailed with several displacement maps (from low frequency to really fine grains) so the surface would catch the light properly when rendered with Mglr, the studio's proprietary path-tracer. Then the compositors layered glints and light effects on top of the rendered snow to give it a slight magical touch.

The Heist

For the theft sequence, the town's real-world layout logic gave way to stylization. "We composed the shots in this sequence to support what [Grinch] was stealing, rather than be beholden to where things were in town," says Cheney. The thievery plays out in a large sequence where practically every shot takes place in a different location – on rooftops, in living rooms, within chimneys – becoming more and more stylized as Grinch progresses.

"We're getting into his head," he adds. "He's been living for this the entire movie, and it's going off without a hitch. He's euphoric."

All the Whos were all dreaming sweet dreams without care. When he came to the first little house on the square. This is stop number one, the old Grinchy Claus hissed, And he climbed to the roof, empty bags in his fist.

In fact, the town was designed to make it difficult for Grinch to pull off his ambitious plan. "We deliberately made Whoville so big that it seemed impossible to steal Christmas there in just one night," Cheney says.

Well, nearly impossible. Grinch had to get creative and use his crazy machines and contraptions, including a customized sleigh and a giant Swiss Army Knife candy cane. "We wanted it to be something people haven't seen before, to give them a fresh take on how Grinch stole Christmas," Cheney says. "The sequence was difficult to figure out and shoot, but it was a lot of fun."

The End

Of course, we all know how this story ends: The Grinch is moved by the selflessness and forgiveness of the Whos. "I think now, more than ever, it has a really great message," Mosier points out. Agreed. And, no doubt the film will make all of our hearts grow a little, too. ■

And what happened then? Well...in Whoville they say, That the Grinch's small heart Grew three sizes that day!

Karen Moltenbrey is the chief editor of *CGW*.

WHOVILLE DOES CHRISTMAS IN A BIG WAY.