

AirSpace Transcript Season 9 Episode 12: Defying Gravity

Matt: It's also like. a stone on the path towards Star Wars. It all leads to Star Wars. But anyway...

Emily: All roads don't lead to home, is what you're saying? They lead to Star Wars?

Matt: They lead to Star Wars.

AirSpace theme in and under

Emily: Welcome to AirSpace from the Smithsonian's National Air and Space Museum. I'm Emily.

Matt: And I'm Matt. Lions and tigers and bears. Oh my! Those are some of the things in The Wizard of Oz that don't fly, but we're more interested in the things that do.

Emily: Flying houses, flying broomsticks, bubbles, monkeys, a hot air balloon, even a floating wizard head. That's more of an optical illusion than flight, but you, it's fine.

Matt: With a new Wicked movie coming out, we decided to dive into all the things that fly in Oz and how those flying effects are achieved, both on screen and on stage, today on AirSpace.

AirSpace theme up and out

Emily: I feel like the Wizard of Oz is classic. It's timeless. Nobody ever thinks about the history of the, I don't think about the history of Wizard of Oz, because it's always just been there. But Matt, what's the history? Historian, step up.

Matt: Well, it hasn't quite always been around. It's been around for more than a hundred years though, so it was written as a book, first by L. Frank Baum¹, who created all of the characters and the story of the Wizard of Oz in a series of books that take place in the land of Oz. And that first book was released in 1900. It was called The Wonderful Wizard of Oz.

¹ <https://www.britannica.com/biography/L-Frank-Baum>

Emily: So the book was popular enough when it came out that it was turned into a stage show in the early 1900s called *The Wizard of Oz*². And this was still all kind of happening just before we started flying airplanes in the sky.

Matt: Right, so you're not gonna find airplanes in the *Wizard of Oz* but you are gonna find other things flying, you know. It has witches, so of course witches fly, and the witches in the *Wizard of Oz* fly in a variety of ways, but then you also have hot air balloons and houses flying in the air. There's just quite a lot of things that end up leaving the ground in the *Wizard of Oz*.

Emily: And the movie that I think most of us are familiar with, with Judy Garland and those beautiful ruby red slippers, came out in 1939 by MGM³, and this was at a really intense period in world history, right, with World War II really starting to heat up. And this was just before the U.S. became involved in the war directly.

Matt: Yeah, it came out in a really important moment historically on the world stage, but then also within the world of film, this was also a very important moment because it's sort of the advent of color movies⁴. And so the film very dramatically illustrates that by shifting from black and white to color, but also all of the other technical achievements of, of the film. You know, this incredible soundtrack and all of the visual effects that go along with it. Right. It transformed the book into like this multimedia spectacle with song, dance, color, sight, sound, flying, everything!

Emily: So while Matt and I care about all the things flying in the movie, *The Wizard of Oz*, we don't, at the museum, have a *Wizard of Oz* collection. That collection belongs over at the Smithsonian's National Museum of American History.

So we turned to one of our colleagues across the National Mall

Ryan: I'm Ryan Lintelman⁵. I'm an entertainment curator at the National Museum of American History

Emily: Ryan's an expert in the *Wizard of Oz* and the making of the film. He's responsible for the iconic ruby red slippers, the scarecrow's costume, a technicolor camera that was used in the film and a whole bunch of other *Oz* artifacts.

² [https://en.wikipedia.org/wiki/The_Wizard_of_Oz_\(1902_musical\)](https://en.wikipedia.org/wiki/The_Wizard_of_Oz_(1902_musical))

³ <https://www.imdb.com/title/tt0032138/>

⁴ <https://www.studiobinder.com/blog/what-is-technicolor-definition/>

⁵ <https://profiles.si.edu/display/nLintelmanR6102009>

Matt: Despite the book being more than a hundred years old at this point and the movie being almost 80, the wizard of Oz is still very relevant pop culture that if you reference it today, people will know exactly what you're talking about.

Ryan: So it was a huge success upon its release. It also became such a popular film because it, it aired every year on television starting in 1956. So generations of Americans who didn't see it in 1939 when it was first released then saw it on television in reruns and, you know, watched it with family and it was a holiday tradition for many people.

And then in the years since the 1939 film, it was, you know, sort of reconfigured and, uh, made for new audiences and things like *The Wiz* and *Wicked* and all of these different stories, uh, or different ways of telling the same story of *The Wizard of Oz*.

Um, and, you know, has just sort of become part of our culture in so many ways. Probably one of the most quoted movies of all time, maybe the most quoted works of, of art of all time, like after the Bible, you know, in American culture.

Some of the phrases that we have, like, you know, 'we're not in Kansas anymore', and 'pay no attention to that man behind the curtain,' 'there's no place like home,' these things are just common lexicon now. And they all come from the movie, but really from the 1900 book. So it's one of those pieces of American culture that's sort of indelible and remains resonant like I said, for over a hundred years now.

Emily: And we mentioned at the top Matt, that the book and the movie were released in really different historical contexts and cultural contexts. The book came out just before the Wright Brothers took their first flights in 1903 and the movie came out in 1939 just before the U.S. really entered directly into World War II.

Matt: Yeah, that's right. And in the book and in the movie, the character that Dorothy first runs into when she runs away from home is a traveling showman who does hot air ballooning tricks. And I think this is probably something that Baum might have experienced himself, having, you know, lived in a world in which flight was kind of on the horizon, there were already hot air balloons and you would see them at special events, festivals, what have you.

And then there were already people, even though there was no, like, Wright Brothers, Wright Flyer⁶, successful flight yet, there were people experimenting with flight, and that's the context in which the Wright Flyer gets developed. So, you know, flight would have been maybe something that was in Baum's mind when he was writing *The Wonderful Wizard of Oz*.

⁶ https://airandspace.si.edu/collection-objects/1903-wright-flyer/nasm_A19610048000

Ryan: Flight is really a central theme in the film from this early desire of her to fly away from home and, you know, Professor Marvel when she first meets him says, you know, 'you want to see other lands, big cities, big mountains, big oceans,' and this, you know, flight is the way for her to get away from that.

Emily: And even though we've talked on the podcast before about all of the different really important historical moments in which hot air balloons have sort of taken part, there's also a big sense of whimsy and sort of fantasy around a hot air balloon. I mean, balloon mania⁷ was huge, and it's a very whimsical sort of moment in history.

Matt: Yeah, I think you're right, and I think there is kind of something I don't know... I work at the National Air and Space Museum so maybe I'm biased or maybe this is something that's just part of who I am, but I think hot air balloons and the idea of lighter than air flight⁸, which we've talked about before on this show, are really kind of magical.

Emily: But they kept that whimsy alive, I think, in the movie by sticking with the hot air balloon instead of going with airplanes.

Ryan: It's probably the hot air balloon rather than using an airplane in the movie, I think is probably in part staying true to the original Baum story. But also that association with the hot air balloon and kind of being from an earlier time. You know, it's sort of a nostalgic film, even, you know, in 1939 much less to think about today, how we look back at it, it wouldn't have had the same resonance, I guess, if she was getting into a modern airplane to try to fly back home, there's, there's something about the unpredictability and the quaintness, I think, of hot air balloon flight that was, uh, what they were going for in making the film.

Matt: And although we've kind of highlighted the sort of bright, colorful, fun aspects of the movie, you know, there were some things that were presented in the movie that would have maybe, you know, tapped into some of the trepidation that people were feeling about the war in Europe. Including the famous flying monkeys scene, which, you know, the monkeys are really presented as flying in, kind of, squadrons that would have reminded audiences at that time of those flying squadrons of the Luftwaffe, the German Air Force in the, the war in Europe.

Emily: Well, and as a kid, I always knew the monkeys were terrifying, but I didn't fully appreciate all of the imagery that was coming into what made them so extra terrifying, right? They weren't just these, like, grotesque, gargoyle-y kind of flying monkey

⁷ <https://en.wikipedia.org/wiki/Balloonomania>

⁸ https://airandspace.si.edu/collection-objects/great-balloon/nasm_A19680115000

situations. There was this layer of additional imagery on top of it that was really kind of like going back to Nazi Germany.

Matt: Yeah, that would have been very much on people's minds at the time and you know when these monkeys take to the air flying from the witch's castle they you know, the skies are dark. It's very ominous when they take flight. It's not like a whimsical thing seeing a flying monkey in this movie. It is very ominous.

Ryan: They're one of these really terrifying moments in the film the idea of these sort of monkeys with grotesque faces and these giant sort of eagle wings flying around causing mischief.

The thing that really struck me upon re-watching the film recently is when you see the squadrons of them in the sky flying over. I mean, it really gives you this ominous feeling like World War II is on the horizon, here come the bombers flying in. And I think that wouldn't have been lost on audiences in 1939, you know, seeing some of the images coming out of Europe at that time and, and worrying about what was coming next.

Music Button

Emily: There's a lot of history to unpack when it comes to the depiction of witches in folklore. And, Matt, might we say ugly history⁹?

Matt: Yeah, I mean if you wanna look at it critically, the history of witches in folklore, although when we look at it today, it seems kind of innocent, this sort of fairy tale witch story. At the time that, you know, these stories were first generated, they were really an early form of misogyny¹⁰, right? They were ways of turning any power that women had into something negative.

Ryan: It's interesting just kind of considering the whole history of flight and the ways that it's represented in, in popular culture and folklore, that witches are often associated with these flying brooms and that's a representation of, of the home, right, and, and so much of this history of witchcraft, I think scholars have looked at, it's like a, a fear of female autonomy and female power. And the broom being a representation of home and hearth, and one of the things that, you know, women are associated with. It's only natural, I guess, that they get up on the broom and fly away on it.

⁹ <https://salemwitchmuseum.com/videos/witch-trials-and-antisemitism-a-surprisingly-tangled-history/>

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<https://www.womenscentrecalgary.org/witchcraft-and-womanhood/#:~:text=Historical%20representations%20of%20women%20as.to%20temptations%20by%20the%20Devil.>

So it's, but it's a representation of that fear of, of what can women do, you know, they could leave you. And if you're a man in medieval Europe, you know, that's a big problem.

Emily: I think that in The Wizard of Oz you get this very standard depiction of a witch. I remember as a little kid being like, what do you mean there's a good witch? Because I had this very like, black garb, pointy hat, green face, which-a lot to unpack there, too-that's my standard perception of what a witch was when I was a little kid.

So the whole good witch versus bad witch thing, I was like, 'there's such a thing as a good witch?' It was mind blowing to me. But in The Wizard of Oz, we have this very standard depiction of what a witch, as a woman, looks like. She's very mean. She's very mean to Dorothy. She wants to take her little dog away. And it turns the witch in Oz into the primary villain of the story.

Matt: Right, and we see the witch emerge in this story when Dorothy is lifted up in her house by the tornado and she sees out her window a woman, a neighbor, riding on a bicycle, and this woman has been mean to her and has threatened her dog, Toto, and in the course of flying in the tornado, the woman on the bicycle turns into the Wicked Witch that Dorothy later has to confront.

Ryan: As much as she's dreaming about flight, she then almost immediately sees sort of the terror of flight too, right? When the tornado comes in and takes her, this is her first flight, if you think about it, is that she's picked up in the house and carried away. And you see some of these things that are associated with her old way of living also flying with her.

So you see the chickens and the turkey flying around in the tornado, the cow, men in a rowboat. And then you see Miss Gulch, you know, who's, uh, her neighbor who wants to take Toto away. She's flying around with her too, first on the bicycle and then it transforms into the, the broom when she also transforms into the Wicked Witch.

So you see this is, uh, this very scary moment the terrifying reality of flight, you know, which must have struck a lot of Americans at that time, taking their first flights, that, 'oh God, you know, here I am up in the air'. You know, like, 'I can see my home from here, you know out the window.'

But then, you know, she sticks the landing, right? And when she lands, she says, 'Okay, we must be over the rainbow. I made it.'

Emily: And so while a lot of the special effects of how you get a human on a bicycle to fly are pretty standard, right? Humans hooked up to harnesses, hooked up to wires

hanging from ceilings. The special effects that the movie used to create the tornado were incredibly cutting edge for 1939.

Ryan: One of the interesting things about the tornado sequence¹¹ is that the person who was in charge of the mechanical effects for the film, whose name was, uh, A. Arnold Gillespie¹², he was a longtime pilot, and he was actually tasked with figuring out how they were going to make this illusion work in the film.

And obviously this is before the days of CGI and all of these were practical effects. So what he had to do, especially in the sort of the long shots where you see Kansas and the tornado in the background, um, this has been written about a lot because it's such an important moment in sort of special effects history.

But he built a scale model of the Kansas scenery that we see earlier in the film. And then he fabricated this 35 foot long muslin windsock, essentially, that went from a gantry up above down to a little miniature car that was driving around on the set. Um, and by moving this car around the set and then through the gantry, they were funneling dust down through that windsock to kind of make it look like this, you know, the tornado was tearing up the earth.

So they filmed that first and then projected that in the background of the, the moment where, you know, Dorothy's running around trying to figure out where to stay, you know, during the tornado.

Then the scene where she's actually in the house and she's flying, they were able to do the same thing to, to actually create a film first and project it out the window.

Matt: Dorothy ends up flying away to Oz inside of the house, swept away by the tornado. It's really pretty frightening, um, when you think about it. And even though Dorothy had dreamt of escaping from Kansas, this isn't quite what she had in mind, right?

Emily: I mean, but rainbows are always after tornadoes. That's probably not what she imagined.

Music Button

¹¹

<https://www.wqad.com/article/weather/hail-to-the-chief-the-making-of-the-ultimate-tornado/526-c5327a73-308f-4f14-8789-3e4b895729a7>

¹² <https://www.imdb.com/name/nm0318901/>

Matt: Earlier, Emily, you mentioned there's a good witch and a bad witch in this story. So we have Glinda the good witch. And the two witches really couldn't be more different from each other, both in appearance, but also in their modes of transportation. So whereas the Wicked Witch of the West travels around on a broom, as we've said before, Glinda has a more graceful form of flight.

She flies around in a transparent bubble. Which was created for the film in a combination of the technicolor that made the Wizard of Oz iconic, and a technique called double exposure, which if you've used a film camera, you might know what that means.

Ryan: I'm thinking about Glinda's bubble¹³, just a very of that moment, this translucent, kind of shiny, multicolored bubble that's intended to show off the technicolor technology that the film was made, you know, made with. Um, but also it's a product of that moment in history and filmmaking that they were able to figure out not only how to render that color correctly, but to do a double exposure where there was a ball that was made and the camera was actually zooming in on the ball. And then the film of that was transposed over the film, you know, with Glinda appearing in the bubble.

So that method of flight for her, you know, was, was really, you know, sort of, trickery of the camera lens rather than it was, you know, represented, I think, in the Broadway production of Wicked, for instance, you know, it's sort of a more mechanical, uh, bubble that she travels in. So you see some of those changes over time based on the technology that they're dealing with.

Emily: So while I've never seen Wicked, the stage production, which is based off of a book by Gregory Maguire published in 1995. They had to figure out how to translate this iconic bubble, especially that in everybody's minds is this beautiful, like, Glinda bubble from the 1939 movie into a stage production and a stage production with a very 'wicked' vibe. And it becomes this kind of steampunk upgrade to kind of match the aesthetic of the rest of the show.

Matt: Yeah, and while the, the productions that we've talked about so far in this episode are really adaptations of the original story and basically follow the same beats of that original story as laid down by L. Frank Baum, Wicked is really a different type of story set in Oz. It uses a lot of the same characters, but it's really in some ways like a prequel to the story that Baum tells and really gives a lot more time to developing. The characters of the two witches, along with a lot of other characters as well. And the politics of Oz that by the time Dorothy lands in the land of Oz have set the two witches against each other.

¹³ <https://theasc.com/magazine/dec98/wizard/pg3.htm>

Ryan: Yeah, the interesting thing about *Wicked* is finding another way to reinterpret this story for audiences that in some ways are more sophisticated or at least seeking a new take on a familiar tale.

And so, this idea of looking at a villain who's presented in sort of the Hollywood way as, you know, wearing the all black costume, being of evil intentions, you know no sort of back story beyond just trying to cause havoc and mischief for the main protagonist of the film.

Instead, you know, looking and seeing that there's more complexity to that character and trying to understand what her motivations are. In the collection at the American History Museum, we have an Elphaba costume from the original Broadway production. And one of the things I like to point out when I show people our collection is that the costume designer has created it out of a bunch of different types of materials¹⁴, and they're all different dark cloths, but they're very dark blue, very dark red, you know, you see all these different colors and shades and textures.

And that's, I think, what Gregory Maguire was doing in the book, and then in the stage production also, looking at this character that, you know, in the Hollywood production it's wearing jet black, uh, evil makeup, long nose, you know, presented with all of the traditional, evil characteristics of, of witches from folklore and very black and white, good versus evil terms, and instead showing the complexity of that character and looking for, you know, what are the motivations here and trying to understand it better.

Emily: So Matt, I haven't read the book, I haven't seen the stage production, and the movie's not out yet. So, I'm starting from scratch here. Can you compare the vibes?

Matt: Yeah. *Wicked* is really a different type of story¹⁵. Like I said, it's, it's a little bit more, grungy, I guess?

It's like, if you kind of think about more of like a coming of age story. Right, about the Wicked Witch of the West and how she goes from being a little girl who is different from everyone else around her because she has green skin and she's talented in different ways, especially magical ways. It's, it's really a story about her and how she grows and really becomes this very like moral and righteous character who cares about the land of Oz and who cares about especially the magical creatures of Oz who come under attack under the reign of the great and powerful Oz.

14

https://www.si.edu/object/dress-worn-elphaba-wicked-witch-stage-production-wicked%3Anmah_1449804

¹⁵ [https://en.wikipedia.org/wiki/Wicked_\(musical\)](https://en.wikipedia.org/wiki/Wicked_(musical))

Emily: It sounds like, Matt, the difference in these two stories in a way, it's kind of exemplified by the differences in how the bubble that they can travel around in is perceived, right? As we mentioned, very frothy in the 1939 film, but in *Wicked*, it has this kind of, like, really industrial feel.

Matt: So Glinda's bubble in *Wicked* isn't really a sphere. It's more like, you know, a very elaborate metal latticework¹⁶ circle that she's kind of strapped into as she makes her way down onto the stage.

Emily: And this is all kind of controlled in the way that you might expect things on stages and big productions to be controlled with harnesses and wires to help all of this happen safely.

And similarly but differently, Elphaba, or the Wicked Witch of the West, flying on her broom also happens similarly but very differently, right? Because we still have to have harnesses and ways in which we can control motion across the stage while not touching the stage. But it's a little bit more of an elaborate system because you not only have a costume that is designed to obscure all of this apparatus, but rather than just being hooked up to an elaborate harness and cables, Elphaba stands on this little platform, kind of leans back a little bit and kind of, it looks very Medieval, right, in a way, kind of like triggers this like hidden button that sort of then activates these braces that kind of wrap around her waist and holds her secure to that¹⁷.

And her costume is designed specifically to obscure all of this infrastructure, to make sure her performance looks as zero G as possible.

Matt: So as you noted, neither of us have seen *Wicked* on stage yet. And it sounds like we're going to have to wait a couple of years before it comes to D.C. But if you're somewhere where it's showing, you know, go see it cause it sounds great. But I have read the book. I'm excited to see the new movie when it comes out in November¹⁸. And I'm always excited to watch the original movie, the 1939 movie.

Emily: Yeah, and it sounds like the cast is going to be really outstanding and it's going to go in two parts. Um, and we'll maybe have to circle back on a movie mini so we can compare and contrast how much air and maybe a little space we can find in it.

I mean, I don't think there's going to be any space in it, but you know,

¹⁶ <https://www.youtube.com/watch?v=FoqGgnqqfZc>

¹⁷ <https://www.youtube.com/watch?v=IMY3a0N7W9Q>

¹⁸ <https://www.imdb.com/title/tt1262426/>

Matt: I mean, I assume, I assume that witches use the powers of the cosmos, right? There must be some kind of connection between what's happening in space and the powers that the witch has at her disposal at any given moment.

Emily: You mean just, like, physics?

Matt: I was thinking more like, you know, the subtle influences of the heavenly spheres, but yes, physics, sure.

AirSpace theme up and under

Emily: AirSpace is from the Smithsonian's National Air and Space Museum.

It's produced by Jennifer Weingart and mixed by Tarek Fouda. Production help by Erika Novak and Sofia Soto Sugar. Our social media manager is Amy Stamm.

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