

Animation Technology:

Defining A Medium, Not a Genre

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The idea of telling stories through a visual lens has become a reality through countless art forms, and arguably one of the most renowned in today's age is that of filmmaking. Movies can come in many forms, representing many different genres- each with its conventions and tropes. However, the term "genre" is often thrown around too generously. A genre (according to the Merriam-Webster Dictionary) is meant to categorize works based on a "particular style, form, or content". So, with that said and done, it can be argued that animation is not a genre, but rather a storytelling *medium* that parallels film. Animation has been used over the past centuries to illustrate countless different types of stories, each with distinct goals in mind, and the only traceable link between everything lies in the technologies making animation possible.

"Traditional" Animation

Throughout the 1800's, the first breakthroughs in early animation tech were created. Both the phenakistoscope (1833) and zoetrope (1834) relied on a spinning motion and slits between drawings to give the illusion of movement. Still, the products of these machines were far from being films in the way we know them today. For starters, one could only appreciate the art through a peephole or boxed-in lens, so the experience was individual. Moreover, the longest pieces were made with 48 hand-drawn frames, which could yield either two or four seconds of animation based on whether 24 or 12 frames per second were used to play the reels. These clips were also without audio and just seen as technological development more than anything else. Towards the end of the century, French inventor Charles-Emile Reynaud sought to change that. In 1877 he created the mirror-and-reflection-based Praxinoscope, only to follow it up the next year with the Theatre Optique. This was a device that projected moving pictures that were painted onto strips of gelatine crystalloid. Because of this, two huge developments were made: projection allowed for actual groups of people to enjoy the same

content at the same time, and the new technology made it possible to stream longer narrative movies. The first film to be presented with the Theatre Optique was Reynaud's *Pauvre Pierrot* (1892), made with 500 frames, and with a runtime of 15 minutes. The film was a sort of romantic comedy, and it was screened to hundreds of thousands of viewers, up until 1900 when live-action films took more precedence. The long-lasting result of Reynaud's invention was the new groundwork established to influence animation –and even cinematography– technology for years to come. However, the success of *Pauvre Pierrot* opened the doors of animation to the world on a scale never seen before and set the stage for countless expansions of the medium.

Paper Stills and the Beauty of Layers

While Reynaud worked in France to develop what would become a precedent for frame-by-frame animation, Charlotte “Lotte” Reiniger worked in Germany pioneering the world of paper-based silhouette animation. Instead of relying on hand-painted stills being spun to create the illusion of movement, Reiniger made paper figures with pins at the joints that she would move individually for each frame. She practiced a version of what is now known as stop-motion animation. To capture her works, she even invented her own machine: the Multiplane Camera. This device allowed animators to almost stack individual elements on top of glass panes, and a camera would photograph the whole shot from above. It revolutionized animation by giving artists the ability to create “depth” in their scenes, alongside the flexibility to move individual parts across the screen at different speeds (the further an object was from the camera, the slower it would appear to move). Reiniger's *The Adventures of Prince Achmed* (1926) was made using the Multiplane Camera, and it ended up being the first-ever feature-length animated film at just over an hour in length. Much like many of Reiniger's other works, this movie was a fantasy and adventure film. *The Adventures of Prince Achmed* would prove to be a keystone in animation

history, however, because of the layering techniques created during its production. This idea of stacking pieces to create depth got carried on into cel animation and has continued to evolve and be used even to this day.

Disney: Princesses and Propaganda

Cel animation, invented by Earl Hurd and John Bray in 1915, is done by artists hand painting their characters onto celluloid sheets laid over painted backgrounds. While many artists worked on small-scale projects using the new techniques, it wouldn't be until the late 1930s that they would truly take off on a massive scale... and that's all thanks to one person: Walt Disney. In 1937, *Snow White and the Seven Dwarfs* was the first feature-length cel-animated movie to be released, and its impact was immense. The musical fantasy was made using an updated version of Reiniger's multiplane cameras, and it grossed \$8 million upon release, establishing Disney as the new face of animation—for better or for worse—for decades to come.

By September of 1939, World War II had officially begun, and both the Allied and Axis powers were trying to capitalize on new ways to get their ideas diffused to as many people as possible. As such, propaganda took on many forms: posters, news articles, radio speeches, and yes, even films. At this point, animated short films and cartoons were one of the most effective ways to get propaganda across because their short runtimes made them cheaper and easier to produce, and the animated medium allowed total creative control to the artists. Artists used this new level of control to create highly biased narratives, usually complete with racist or offensive portrayals of the enemy.

With all this in mind, one of the biggest producers of Anti-Axis Powers cartoons was none other than Walt Disney Animation. Amidst the financial tensions brought on by the war, from a financial perspective, it only made sense for the studio to take on the commissioned

propaganda work. According to the Smithsonian, “by 1943, upward of 90 percent of Disney’s work was related to the war effort”- and that all culminated in about 68 hours of continuous content. Short films such as *Der Fuehrer’s Face* (1943), *Reason and Emotion* (1943), and *Commando Duck* (1944) featured iconic Disney characters and served to dehumanize not just political war leaders, but also the citizens of Germany and Japan. The films were distributed in schools all across the United States and seen by millions of impressionable children, as well as on general television to appeal to American patriots. Profit-wise, since these were all commissioned by the US government, there was guaranteed money to be made, and this income can be attributed to why Disney even made it out alive after the war. In the same period, cel animation was also used for other Disney classics such as *Dumbo* (1941) and *Bambi* (1942) both released in theaters for a wider, more general audience, but neither was particularly successful... definitely because no one was prioritizing a trip to see a movie amidst the very real crisis going on. *Dumbo* had a budget of \$170 million but grossed \$114.8 million domestically, and *Bambi* had a (very low) budget of \$858,000, grossing \$102 million domestically.

Even so, as far as modern pop culture is concerned, if you ask anyone which type of film they associate more with Disney- propaganda shorts or fantasy features- they will be far more likely to list off the latter. But why? After the war, as soon as Disney was financially stable again, every possible effort was made to wipe these political pieces from the culture’s consciousness. Today, on Disney+, not a single one of those works can be streamed, but every other feature film (and their sequels...) can be found there instead, as their purpose was simply to entertain and tell a story. Cel animation continued to be used by various studios to present the public with escapes from reality, and over time, no one felt the need to restrict the medium to *just* propaganda or *just* entertainment. Across the 30-ish years from WWII to the eventual invention

of Computer Generated Imagery (CGI), Walt Disney Animation released 16 feature films. At least in the Western world, no other animation company stood a chance against the domination that Disney had on the industry, largely because there was not nearly as much financial recovery to do because of the propaganda profits.

CGI and the Steps Taken to Make Animation Look More Lifelike

3D animation- or CGI- was almost a direct digital fusion of the types of animation that already existed. It still relied on the foundational frame-by-frame principles of 2D animation, but due to the more dynamic nature of the elements being manipulated, getting to those frames felt more like a newer version of puppetry and stop-motion animation. The first projects with CGI were made in the 1970s. For instance, the surrealist short film *La Faim (Hunger)* was directed by Peter Foldes in 1974. In contrast to all the aforementioned films, *La Faim* had a much more narrow adult audience, as it tackled topics of morality and criticized the society of the time. A very important development brought about by *La Faim*'s production was that of "keyframes" - principal shots that block out action and rely on "in-betweens" to fill the gaps, created either by hand or generated by a computer. To recognize this technological achievement, *La Faim* became the first computer-animated film to get nominated for the Best Animated Short Film category at the Oscars.

By 1995, Walt Disney Pictures released *Toy Story*, produced by Pixar Animation Studios. It was the first ever fully CGI feature-length movie. This goes without saying, but the film was incredibly successful, having a \$720 million budget but grossing \$3.3 billion worldwide. *Toy Story* is categorized within the comedy and adventure genres, and it appeals to general audiences. Above all, however, lie the countless technological precedents set around its production.

“Rendering” is the process by which a computer reads all of the 3D elements and combines them into a single, 2D image; with the rudimentary technologies of the late 1980s, this process simply could not be done at the large scale that a feature film would have demanded. Too many elements would be on every frame, and frankly, no processor at the time could handle the sheer amount of footage that would be needed. So, a few years before setting out to make *Toy Story*, Pixar worked to invent an entirely new software to render their animations, known today as RenderMan. It has become the industry standard and is still used and renovated today by animation studios worldwide.

Pixar also faced another challenge: lighting. With 2D animation, lighting, and shading are usually reserved for backgrounds or especially bright scenes, but it is not usually a priority due to the inherently flat nature of the medium. Even in cartoons today, most 2D animation takes on art styles that rely on “flat colors” to save time and money instead of hand drawing in every bit of lighting unless it is absolutely necessary. In contrast, 3D animation demands lighting and shading to complete the illusion that the characters are more than flat drawings on a screen. To achieve this, Pixar created another software, Marionette, to work in tandem with RenderMan. According to *The Making of ‘Toy Story’*, an article by Henne et al. (1996), the two software working together allowed animators to “alter the shape, softness, and extent of a light, ...allow the light to shine only on specific objects... [place shadows] independently of their casting lights, [and alter reflections] to suit an artistic purpose”. Since every element in a CG animated film is a 3D model, the approach to lighting a scene is reminiscent of lighting a live-action film shot-complete with key lights, fill lights, and rim lights.

Today, CG animated films of all sorts rely on lighting techniques based on the ones pioneered by Pixar back in the ‘80s. In the 2020 Sony Animation film, *Over the Moon*, the

entire world of Lunaria is riddled with light sources. All of the buildings, all of the creatures, and all of the magical elements glow in some way, shape, or form. Still, each element emitted light differently to better suit the overall composition of the present scene. Clara Chan, the film's CG supervisor, spoke on how modern technology helped manipulate the complicated lighting in an interview with Ian Failes. "Sometimes we have a very specific amount of specularity and we don't obey the physical rules of refraction", Chan said, "... We added layers to [the shader] so that it could scatter the lights, and refract the lights, and then also have control for dialing the specularity very specifically". All of this is to say that the long-lasting effects of what Pixar invented all those years ago are still being felt, as animation techniques continue to evolve. Yet, in spite of their similar technologies, *Toy Story* and *Over the Moon* are very distinct films. One is an adventure-comedy about sentient toys learning about how friendships evolve over time, and the other is a musical fantasy about a girl who learns to process grief by visiting a world inspired by traditional Chinese mythology. To group these two into one category would be a disservice to either movie. This comparison would be like if someone compared *Back to the Future* (1985) to *West Side Story* (1961 or 2021... the point still stands)- both of these films using creative lighting techniques to visually guide their story along doesn't take away from the fact that one is an adventure/comedy and the other is a musical/romance.

When Worlds Collide

In recent years, there's been a new trend sparking up. Some would even go as far as to call it a new "renaissance" in the world of CG animation. At least in the Western World of animation, the film that took everyone by storm was *Spider-Man: Into the Spider-verse* (ITSV), released by Sony Pictures Animation in December of 2018. But what set this movie apart from

all the other major animated features of the same period? Its unique art style and how it brought together 2D and 3D animation seamlessly.

But first: the numbers on this film. It should be noted that, as *ITSV* is a Spider-Man property, a plethora of big names were involved in the production and distribution of this movie, (*Columbia Pictures, Marvel Entertainment, Sony Pictures Animation, and Lord-Miller Productions, to name a few*) meaning the extensive budget and access to resources played a huge role in the breakthroughs the animators were able to make. The total production budget came to \$90 million, and the film's development spanned four years, with the work divided between 800 people. All of those factors considered, *ITSV* came together to demonstrate how versatile the medium of animation can be.

For starters, many scenes in *ITSV* have characters moving in different frame rates at the same time. This practice had its peak in the days of multiplane cel animations when the distance from the camera affected the playback speed of elements, but it started to phase out as more modern technologies created alternatives for the same effect. The most iconic example of this in *ITSV* is the scene where Peter B. Parker is trying to show Miles Morales how to use his web-slinging ability in the forest. Parker is animated "on ones", and Morales is animated "on twos". These terms were established way back in the early 1900s, and they're defined as follows: animating "on ones" means that for each second of animation, there are 24 new frames drawn out, and animating "on twos" means for every second of animation, there will only be a new drawing every two frames. The latter is usually reserved for 2D works and stop motion. The final result sees Parker moving smoothly, a representation of his expertise, and Morales lagging behind physically and in skill level.

Another way that *Into the Spider-Verse* used technology to subvert standard CG animation practices was by incorporating 2D animation into the film- both through overlays and visual effects and entirely 2D animated scenes. Now, using 2D animation in 3D films was not unheard of in and of itself; other movies such as *Kung Fu Panda 2* (2011) incorporate 2D animation for flashback and dream scenes. But unlike those projects, *ITSV* used 2D animation to intentionally create stylized versions of effects that could have totally been made with CG- the animators went above and beyond for the sake of the art, bringing a personality to the animation itself. For instance, not a single shot in the entire movie uses motion blur. Not a single one. Instead, the artists relied on the 2D tactic of drawing in smear frames to give the same illusion in a more cartoonish way. The artists also drew in 2D “ink misprints”, modeled after those often found in comic books, to create a unique depth of field instead of relying on standard blurring tools.

Furthermore, to preserve the distinct designs of all the spider-people from across all the dimensions, every Spider-Man is animated in a distinct style. It would have been so much easier (cheaper, and less time-consuming, too) for all of the characters to only be distinguishable on outfits and color schemes alone, but no! Danny Dimian and Josh Beveridge, the Visual Effects Supervisor and Head of Character Animation respectively, did an interview with *Wired* and shed some light on why each character had a different style. For characters like Peter Porker, who canonically comes from a much more abstract and over-the-top cartoon world, the animators made his 3D model appear as hand drawn as possible, exaggerating every single action shot he was in. “Characters like Miles, Peter, and Gwen, all came from the same physical universe, where the laws of reality were all somewhat similar,” Dimian added. “[With] more extreme characters like Ham, Noir, and Penni Parker, we got to push... how differently we could make

them”. By combining 2D practices with 3D technologies in this action/superhero movie, the energy was so much more lively and every moment captivated audiences around the world. So much so, in fact, that *ITSV* grossed \$384 million worldwide— and that’s not even taking into account the additional profit that came from merchandise and tie-ins related to the movie. This massive success not only pushed Sony to fund a two-part sequel project but also showed the world that audiences of all types *want* to see animated movies that try new things.

Following the trails left by *Into the Spider-Verse*, Sony released *The Mitchells vs. the Machines* (2021), a sci-fi comedy, utilizing a similar mixed-media approach to the animation. *Mitchells* was met with critical acclaim for its story and visuals, only encouraging more studios to try and join the bandwagon. Another addition to this trend has been *Puss in Boots: The Last Wish* (2022), produced by DreamWorks Animation and produced by Universal Pictures. Like its predecessors, *The Last Wish* also saw lots of success, grossing \$484.6 million with a \$90 million dollar budget, and most of the discussions online regarding the film were in praise for the paint-like art style.

There’s nothing inherently wrong with the CG style that’s almost become expected thanks to Disney and Pixar’s former domination of the animation industry, but seeing studios branch out and try new things, all while being met with high praise, is a fresh change of pace for the animation industry as a whole.

Award Shows and Their Influence

Speaking of the animation and film industries, however, brings up the elephant in the room: why does animation seem so difficult to categorize? Why do some people deem it a medium, while others see it as a genre? As it turns out, a lot of the misconceptions have stemmed from a common source: award shows.

The first animated film to ever win an Oscar was *Flowers and Trees* in 1932. It was awarded best in the “Short Subjects, Cartoons” category (today’s equivalent would be the award for best ‘Animated Short Film’). At this point, award shows in general were still relatively new, so this award even existing was a huge deal. But as the world of animated films began to expand, so too did the scale of the awards.

In 1991, Disney released *Beauty and the Beast*, and audiences and critics alike fell in love with the movie. In fact, the movie was so well received, that it became the first fully animated movie the Academy nominated for Best Overall Feature. And if that was not impressive enough, *Beauty and the Beast* took home the Golden Globe for Best Musical or Comedy Motion Picture in 1992. Animation’s reputation was elevated to a platform never before seen, and the formal recognition paved a newfound sense of respect towards the medium that others may not have had at the time.

The next big acknowledgment for an animated film came in 1995 when John Lasseter, Pixar’s former chief creative officer, was granted special recognition for his “inspired leadership of the Pixar *Toy Story* team, resulting in the first feature-length computer-animated film”. Things were looking up for animation, morale was high, and it seemed as though an animated film taking home the Academy Award for Best Picture could be on the horizon any year now.

But alas, in 2001, a certain animated fantasy-comedy film was released by DreamWorks Animation, starring a particular green ogre. *Shrek* made its way to the silver screen, backed by a \$60 million budget, and grossed \$484.4 million worldwide (a feat not even *ITSV* can boast). To reward the cast and crew of *Shrek*, an entire category was added to the Oscars so the movie could win an award: Best Animated Feature. And on paper, this seemed like another net positive for

the world of animation. In the short term, sure, that may have been the case, but the long-term effects may beg to differ.

Over the years, animated films have been more and more restricted to *solely* the Best Animated Short and Best Animated Feature categories. If they're lucky to be nominated in other major categories, such as editing or effects, they won't usually win. This has created a standard in the cultural eye for what animation is all about, and it tends to whittle down to "kids' films".

The 2018 and 2022 Oscars have been the biggest examples of this in recent years. In 2018, the nominees for Best Animated Feature were *Loving Vincent* (Mystery/Crime), *The Breadwinner* (Drama), *The Boss Baby* (Family/Comedy), *Coco* (Musical/Adventure), and *Ferdinand* (Family/Comedy). All of these films were nominated under the same "genre"... and any viewing of these films -or their general descriptions- will reveal just how different each one is. The first two aren't even technically rated for children, both having the PG-13 label. Fans of animation were also particularly frustrated that year when *A Silent Voice*, a romantic drama with a mature commentary on mental health, had qualified for a nomination, but ultimately got "snubbed" by *The Boss Baby*. In the end, the win went to Pixar's *Coco*, but many viewers felt that all of the nominated films were too different from each other, and to choose one winner amongst all of the options was as productive as comparing apples to oranges.

Halle Bailey: "...Animated films make up some of our most formative movie experiences as kids."

Lily James: "So many kids watch these movies over, and over, and over, and over and over-"

Naomi Scott: "I see some parents out in the audience know exactly what we are talking about."

That is how the three announcers for the Best Animated Feature category— all women who have played a princess in one of Disney's live-action reboots— introduced the award category in 2022. The nominees were *Encanto* (Musical/Fantasy), *Raya and the Last Dragon* (Family/Adventure), *Luca* (Fantasy/Adventure), *The Mitchells vs the Machines*, and *Flee*

(Documentary). Three of the nominees came from Disney, which isn't necessarily the problem, but that is to say that no one in the audience was surprised when *Encanto* took home the award.

No one could truly be disappointed either; *Encanto* was well-received by critics and casual audience members alike. Still, framing the entire animation category as the one with all the silly kids' movies parents get so tired of was a major disservice to not only the entire medium of animation but also to *Flee*, one of the very nominees from that year. *Flee* documents the true story of a man who had to flee war in Afghanistan and seek asylum in Scandinavia. It is a very personal piece that handles themes of accepting one's identity, and director Jonas Poher Rasmussen has said that he hopes his film will "remind people how important it is that we continue to turn to each other". This documentary was not made to sell millions of dollars in toys, make a lively soundtrack full of catchy tunes, or even be a *fun* film in general. That fact alone does not make *Flee* inherently more worthy of an Oscar than animated films that do strive to reach those goals, however, it could be argued that this is one of the reasons Rasmussen struggled so much to find a distributor for his project. Similar to what live-action indie filmmakers go through, he couldn't just go to a consistent source to distribute his work. In fact, it wasn't until after its premiere at the 2021 Sundance Film Festival that Neon officially picked up *Flee* for distribution. Paralleling the world of live-action movies, the animation industry also has massive, prolific studios that just go to their own distributors: Disney Animation distributes with Buena Vista, and Paramount goes to Paramount Global Content Distribution. This entire case not only serves to prove that animated films cannot be judged together by virtue of the materials used to make them, but also that animated filmmakers don't have one consistent pattern when it comes to distribution. There are different paths to take based on what type of animated film is

being made, to which audience it caters to, and which names are behind it— so many factors simply cannot be put under one narrow genre.

A Closer Look At “The Kids Table”

At the 2023 Oscars, Guillermo del Toro’s *Pinnocchio* won the award for Best Animated Feature. After receiving the accolade, del Toro stated that “animation is cinema, animation is not a genre, and [it] is ready to be taken to the next step.” In a separate interview with NBC News, he also went on to say: “[Animation] is an art form that has been kept commercially and industrially at the kids' table for so long.” To put it simply, del Toro has a point. Even within the last few years, the biggest animated projects have at least had a majority appeal to younger audiences: *Trolls World Tour* (2020), *Minions: Rise of Gru* (2022), *Turning Red* (2022), *Trolls Band Together* (2023), *Teenage Mutant Ninja Turtles: Mutant Mayhem* (2023)... Granted, some of those films may have underlying themes that resonate with older viewers, but the direction for merchandise and tie-ins all of them went in hints at the true audience. For example, at the same time that *Teenage Mutant Ninja Turtles: Mutant Mayhem* was approaching \$100 million at the global box office, its global retail sales were nearing \$1 billion. This came from the movie’s 400 licensees, which includes major names such as Hasbro, Mattel, Funko, Build-a-Bear, and Crayola. Collaborations were even made through *Minecraft*, *Fruit Ninja*, and *The Sims FreePlay*, where kids could buy themed items based on the movie and its characters. For *Minions: Rise of Gru*, Universal gave a higher budget to marketing and tie-ins than to the film’s production: \$285 million and \$100 million, respectively. *Rise of Gru* ended up being the third highest-grossing film of 2022, bringing in \$939.6 million worldwide, but that number pales in comparison to the \$6 billion that has been made in retail sales.

Now, there are animated films created for more mature audiences. Starburns Industries released *Anomalisa*, a comedy/fantasy movie with an R-rating, in 2015. Originally debuting at the Telluride Film Festival, *Anomalisa* was picked up by Paramount and distributed in theaters by them. The film had a budget of \$8 million but only grossed \$5.7 million worldwide. *The House* is a stop-motion animated horror/comedy piece that also has an R-rating. It was produced by Nexus Studios Netflix Animation and distributed by Netflix. Netflix hasn't released the numbers on this project, but a few comparisons can be made to gauge an idea of how it could have done. Wes Anderson's *Fantastic Mr. Fox* (2009) is another stop-motion movie, and it had a \$40 million budget and grossed \$46.5 million. *Coraline* (2009) was made by Laika with a \$60 million budget and a \$350.5 worldwide gross (the domestic gross was \$57.8 million...). With both of those examples in consideration, along with the fact that Netflix is withholding any announcement of success, and has put a relatively low amount of effort into marketing *The House*, it can be concluded that it must have been a very expensive endeavor that probably didn't yield that grand of a return. Numbers like these don't always give adult-oriented animated films the best reputation, and as a result, may gear the animation powerhouses with more money and access to widespread marketing, distribution, etc away from trying out new things. Making more mature films is still seen as a "risky" move.

The bottom line is that, as of late, the biggest companies have been putting more money and attention into making movies that sell toys and games to kids instead of working to appeal to a wider, possibly older demographic.

Final Notes

Throughout the centuries that animation has existed, the art form has been adapted to tell a wide gamut of stories in tons of unique ways. So many forms of animation exist outside of the

ones discussed in this paper, and they are each used in different ways with distinct goals in mind. The only common thread between *Pauvre Pierrot* (1892) and *Spider-Man: Into the Spider-Verse* (2018) is the shared history and techniques behind the technology used to create them. By that standard, each and every single live-action film would also be judged under one genre. Everything from rom-coms to surrealist horror movies relies on a lot of the same film technology: cameras, lights, microphones, etc.

Admittedly, the Oscars do still have an overall best feature category, where narrative live-action work is compared back to back. (The Best Documentary Feature is still mainly reserved for motion pictures). But enough respect is given to all of those films as individuals to the point where any one can win, and that victory would be seen as one for movies in the “_____” genre...not the “live-action” genre. There is no such thing. And as such, the same grace should be given to the ever-evolving, ever-versatile medium of animation.

BIBLIOGRAPHY:

BUCHAN, SUZANNE. “Animation, in Theory.” *Animating Film Theory*, edited by Karen Beckman, Duke University Press, 2014, pp. 111–28. *JSTOR*, <https://doi.org/10.2307/j.ctv11sn1f6.11>.

DelGaudio, Sybil. “If Truth Be Told, Can ’Toons Tell It? Documentary and Animation.” *Film History*, vol. 9, no. 2, 1997, pp. 189–99. *JSTOR*, <http://www.jstor.org/stable/3815174>.

Frank, Hannah, and Tom Gunning. “A View of the World: Toward a Photographic Theory of Cel Animation.” *Frame by Frame: A Materialist Aesthetics of Animated Cartoons*, edited by Daniel Morgan, 1st ed., University of Cali

- Redrobe, Karen. "The Worries of the World(s): Cartoons and Cinema." *World Building*, edited by Marta Boni, Amsterdam University Press, 2017, pp. 253–71. *JSTOR*,
<https://doi.org/10.2307/j.ctt1zkjz0m.17>.
- Abend, Lisa. "In 'Flee,' Jonas Poher Rasmussen Animates His Friend's Story." *The New York Times*, 26 November 2021,
<https://www.nytimes.com/2021/11/26/movies/flee-movie-jonas-poher-rasmussen.html>.
- "CG Historical Timeline – Computer Graphics and Computer Animation: A Retrospective Overview." *The Ohio State University Pressbooks*,
<https://ohiostate.pressbooks.pub/graphicshistory/back-matter/cg-historical-timeline/>.
- Chase, Marilyn, and Ruth Asawa. "Disney's World War II Propaganda | History." *Smithsonian Magazine*, 11 July 2022,
<https://www.smithsonianmag.com/history/how-disney-propaganda-shaped-life-on-the-home-front-during-wwii-180979057/>
- Curtis, Scott, et al. "Drawing on the Margins: Animation in Film and Media." Edited by Ryan Pierson. *JCMS*, vol. 61, no. 1, 2001, pp. 141-184. *U-M Library Digital Collections*,
<https://quod.lib.umich.edu/j/jcms/images/61.1-infocus.pdf>.
- Kehr, Dave. "Animation | History, Movies, Television, & Facts." *Britannica*, 2 January 2024,
<https://www.britannica.com/art/animation>.
- LUND, KAREN. "Innovative Animators (June 1999)." *Library of Congress*,
<https://www.loc.gov/loc/lcib/9906/animate.html>.
- Mario, Anto, and Arifur Rahman. "The Evolution Of Animation Techniques: From Pencil To Pixels." *Toons Mag*, 8 November 2023,
<https://www.toonsmag.com/the-evolution-of-animation-techniques/>.

“Snow White and the Seven Dwarfs (1937) - Financial Information.” *The Numbers*,

<https://www.the-numbers.com/movie/Snow-White-and-the-Seven-Dwarfs>.

“Walt Disney: Animation Pioneer.” *National Inventors Hall of Fame*®,

<https://www.invent.org/blog/inventors/walt-disney-multiplane-camera>.

WIRED. *How Animators Created the Spider-Verse* | *WIRED*. Youtube,

https://www.youtube.com/watch?v=l-wUKu_V2Lk.