

Received December 1, 2017; Accepted March 11, 2017

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# Optimizing 2D Animation Production Time in Creating Traditional Watercolor Looks by Integrating Traditional and Digital Media

Using traditional watercolor for backgrounds in digital 2D animation



## Abstract

2D animation is laborious. Each frame has to be drawn individually, be it traditional or paperless/ digital animation. However, 2D animation keeps reinventing itself. With current technology in digital 2D animation, we're offered the opportunity to make hand-drawn animation in a way that we couldn't even imagine fifteen years ago with smaller team and lower budget. However we can't deny that traditional 2D animation has its own appeal which makes 2D animation more precious and memorable. That being said, each traditional and digital 2D animation has its own strengths. In this paper, I'm going to combine digital and traditional 2D animation techniques to produce a short animated movie according to their strengths in order to optimize the production time in 2D animation pipeline. Traditional media that is used in this research is watercolor. Animation will be done digitally with Toon Boom Harmony software. This strategy will be tested in the production pipeline of "Rise & Shine" 2D animated short.

**Keywords:** visual exploration, background, traditional, digital, 2D animation, mix media, pipeline, watercolor, Toon Boom, Rise & Shine

## 1 Introduction

Amidst the popularity of CGI/ 3D animations, 2D hand-drawn animations can still soar and hold a special place in its audiences' hearts even when the majority of animated features are dominated by 3D animations. One of the reasons might be because commercially, 3D animations are far more profitable to produce than 2D animations [1]. Yet, the scarcity of 2D animations in animation industry makes it even more precious.

It is undeniable that 2D hand-drawn animation is laborious because each frame has to be drawn individually, be it traditional or digital animation. But with the emergence of new technologies in 2D digital animation, we're offered the opportunity to make hand-drawn animations in a way that we couldn't even imagine fifteen years ago [2]. All the line art and coloring for characters and backgrounds can be done digitally, allowing it to be able to be modified easily. Let alone

the streamlined pipeline. Animators can work only with a set of computer and drawing tablet. It becomes more feasible to be done than traditional 2D animations which still involves pencil and paper.

However somehow in the process, the digitally drawn lineart and color lost their personal touch aesthetically. While we can replicate the looks of traditional drawings in computer, it still doesn't feel quite right. Drawing is just like writing, every person has his/ her own unique style which makes 2D animations have limitless visual explorations. The imperfection of traditional 2D hand-drawn animation is a reminder that humans aren't perfect. And that's why we are drawn to it. Not to mention that in some aspects, we can have more freedom if we do them manually.

That being said, traditional and digital animation pipeline have their own weaknesses and strengths and don't have to be treated separately. The purpose of this research is combining traditional and digital 2D animation techniques to produce a short animated movie according to their strengths in order to optimize the production time in 2D animation pipeline.

The concept of visual style that this research aims is watercolor and pencil looks to support the story in "Rise & Shine" animated short. As for the digital frame-by-frame animation, Toon Boom is used. The discoveries and results of this research could provide an alternative pipeline for 2D hand-drawn animation shorts, especially if the short is done single-handedly in a short amount of time.

## 2 Appeal of Traditional 2D Animation

Traditional animation (also known as hand-drawn animation, cel animation or classical animation) is an animation technique where all the frames used to create the illusion of motion are first drawn on paper and, consequently, done by hand. Some popular traditionally animated films are Snow White and the Seven Dwarfs (1937) and Pinocchio (1940) [3].

Many people these days erroneously suggest that traditional 2D animation is a lost art form [4]. In an interview with Cartoon Brew, Tomm Moore said that today 2D animation has a responsibility, much like painters had after photography was invented, to reinvent what it is. It can't go after realism, because there is no point; it has to do something only 2D can do. In painting, we got Expressionism, Impressionism, Cubism and other modern movements because of photography. *The Tale of the Princess Kaguya* and other Ghibli films point the way that 2D has to keep going to reinvent itself. In the whole history of visual arts, there is still so much that we can explore [2].

## 3 The Advantage of Digital 2D Animation

Modern 2D animators don't just use paper and pencils to create the animated features we see on TV and in the movies. 2D animation has gone fully digital, and uses cutting edge

technology to create the breathtaking detail and artistic fidelity we've come to expect from modern films [5]. With the evolution of technology, the traditional cel animation process became obsolete by the beginning of the 21st century. Nowadays, the backgrounds and characters designs from the animators are either scanned into or drawn directly into a computer system [3].

Nowadays, digital processes have become central in the development of animation. For us, it is highly significant that a special kind of animation that can be considered as *artistic* presides over this evolution [6].

Makoto Shinkai is one of the anime's emerging stars who leads a generation of artists using Wacoms and Photoshop, rather than traditional cels, to create animation. Shinkai belongs to a new generation of animators who have never worked in the traditional pen-and-paper format, and "Voices of a Distant Star" (2001) is a testament to how dramatically computers have changed the animation industry in the past decade. He created the 25 minute short in seven months, using only a Power Mac G4 at a time when PowerPC processors were still reaching for the 1GHz barrier [7].

## 4 Expressing Visual Style Through Textures

Animation relies heavily on artistic composition because animation is a form of visual art and also a plastic art. Since traditional 2D animation is rooted from drawings and paintings, it has the freedom to use unlimited possibilities to use various media to express the meaning of the animation. In animation design, lack of material textures makes the work incomplete [8]. Different materials have different textures and should be adopted according to the style of the work and how the style would help to deliver the concept. Some textures in real hand-painted work are subtle but irreplaceable, sometimes they are too subtle and need to be adjusted in animation to achieve the desired effects.

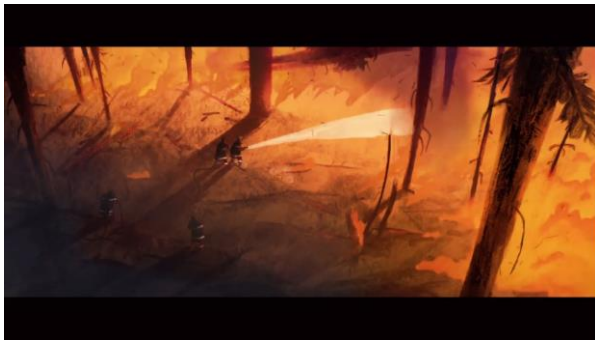
Watercolor paintings have unique textures of transparency and it always allows the line to play an active role in the work itself. The combination of the wet paper and watercolor brush sometimes may result in "happy accidents" where we can see the clear strokes and color bleeds. Working with watercolor, we have to be at the present with it [9]. We can continue to build the color while the paper is wet and add more layers to the transparency or we can leave it dry and add more details. Several techniques to achieve different textures with watercolor are also available, not to mention the watercolor paper itself.

## 5 Relevant Works

Strategies to combine digital and traditional 2D hand-drawn animation techniques have been done before mainly by individuals and animation students to exhibit their capability in aesthetics and skills. Others are created by small scale studios to showcase their work. The most prominent work comes from graduation films of animation students who studied in *Gobelins, L'Ecole De L'Image* (Gobelins, School of

the Image), a school in Paris that, in addition to studies in Graphic Arts, Multimedia and Photography, offers a program in animation [10]. These films mostly have bold visual styles, combining traditional, digital, and CGI animations. They are usually screened in animation and film festivals, mostly aimed for Annecy International Animated Film Festival which is held annually in France.

For example in *AMA* (Liang Huang, 2015), where the main setting is sea/ underwater, the artists behind the short created the background in watercolor and animated the characters digitally in TVPaint software. Similar method is also used in *Wildfire* (Hugues Opter, 2015), except that they are using charcoal for the backgrounds instead of watercolor to support the story which is involving fire and burnt forest.



**Fig.1** A still from *Wildfire* (2015)

she produced single-handedly, interestingly used a similar strategy. She painted all of the backgrounds with traditional watercolor and then animated her characters in Photoshop. In contrast with the soft-colored backgrounds, she strikingly blends it with scratchy black ink characters.



**Fig.2** A still from *Ornitophobia* (2013)

Another different approach of the usage of watercolor in animation is shown in *Happy Time* (Matvey Rezanov, 2014). In this limited animation, the background is not only painted with watercolor but also animated. The film maker used stop motion technique to capture the sequence of watercolor painting process as well as the natural water dripping movements. This method brings out the unique characteristics of different media via hand painting but the high cost, long cycle, difficulty and low efficiency determine that it can hardly be used in mass production of animation movie.



**Fig.3** A still from *Happy Time* (2014)

## 6 Visual References and Explorations

Animated short “Rise & Shine” sets out with a simple story in order to focus more on visual explorations. In this paper, I’m not including the overall discussion of the narrative structure and plots of the short, but concentrate on the mood I’m aiming to be realized in the visual style. “Rise & Shine” sets in the morning up on a green hill with lakes around it. The moods it gives are mainly quiet, damp, and cold (morning). After observing several visual styles, especially in traditional still drawings/ paintings, I’ve found that watercolor-based look is the most suitable and can represent the mood that I’m after. One of the most obvious reason is because it has wet and fresh feel to it.

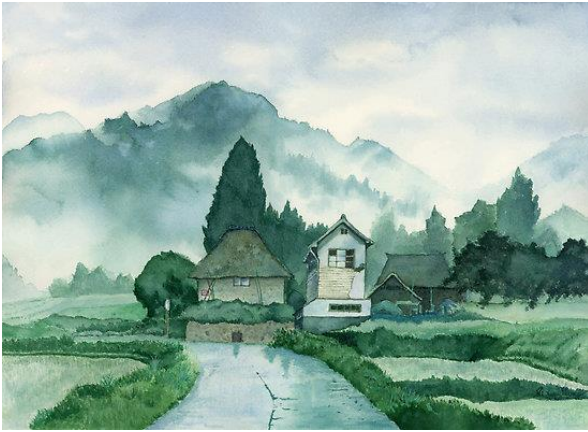
To make the visual style more concrete, I selected visual references of animations that have watercolor feel in their looks based upon my personal preferences as well as the similar moods presented in their works. In addition, I also used some visual references from traditional watercolor paintings of various artists.

For visual references from animations, I used the looks from *Song of The Sea* (Tomm Moore, 2014), *Nebula* (Camille Andre, 2014), and *Madagascar, Carnet de Voyage* (Bastien Dubois, 2010). Among them, *Song of The Sea* has the most prominent style and mood that I’m after.



**Fig.4** A still from *Song of The Sea* (2014)

As for the traditional watercolor paintings, I’m referring to Marlies Merk Najaka’s and Suisai Genki’s work.



**Fig.5** “Japanese Village After Rain” watercolor painting by Suisai Genki

## 7 Production

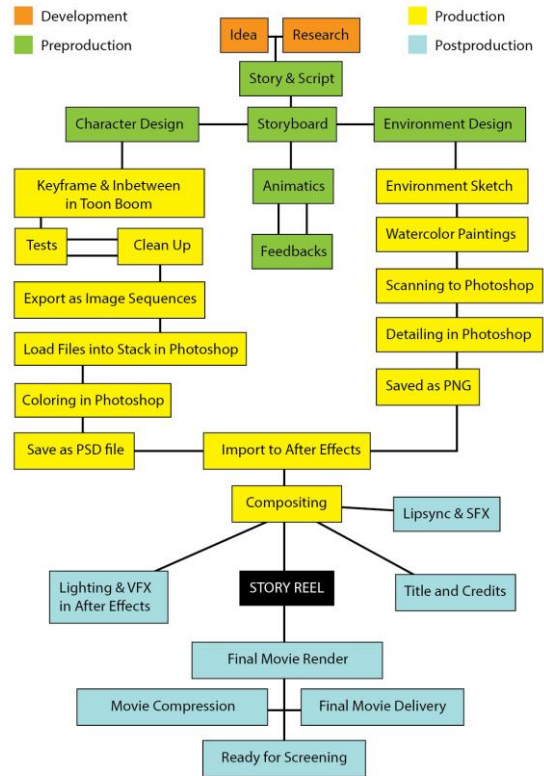
### 7-1 Production Process

In “Rise & Shine” production pipeline, I crossed the process between traditional and digital animation. I observed production process from some of the relevant works mentioned before and made adjustments according to my own approach. The techniques are mostly digital while trying to achieve traditional animation looks. As discussed before, I’m aiming for watercolor look. To sum it up, for backgrounds I started out with traditional watercolor media before adding more details in computer. As for frame-by-frame animations, I did them fully digitally.

For this paper, I’m not going to discuss the preproduction and postproduction process, instead I’m focusing on production as it involves traditional and digital animation pipeline. Nonetheless, the entire pipeline can be seen in **Fig.7**. This animated short was produced in 2015 between September to November. The entire timeline can be seen in **Fig.6**.

TASK	Week													
	1	2	3	4	5	6	7	8	9	10	11	12	13	
<b>Preproduction:</b>														
Research														
Character and environment design														
Script and storyboard														
Animatic														
<b>Production :</b>														
Background watercolour														
Background digital														
Frame by frame animation														
Animation Coloring														
Compositing and Editing														
<b>Post Production :</b>														
VFX and Motion Graphic														
Sound														
Final Movie														

**Fig.6** Project timeline



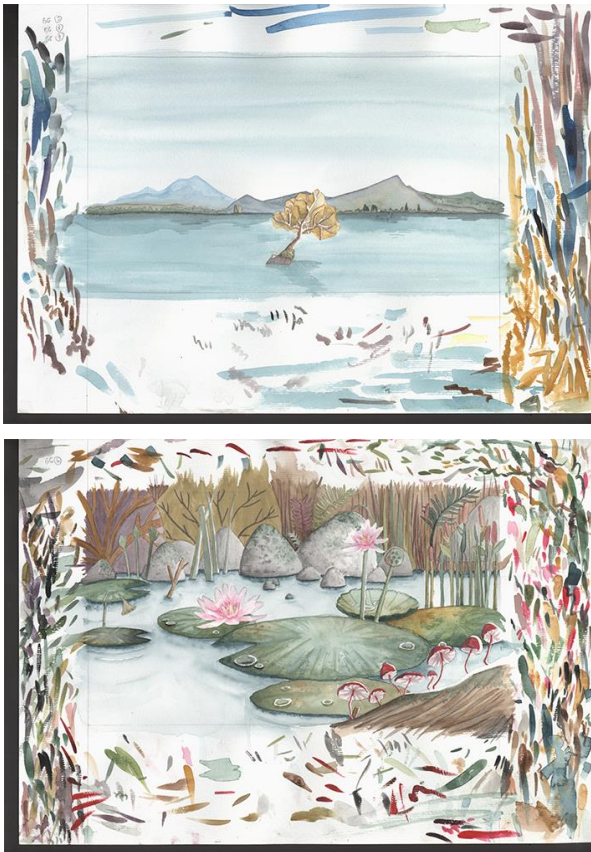
**Fig.7** Project pipeline

### 7-2 Backgrounds Painting

After finishing the concept and storyboard for “Rise & Shine”, I started the production process by painting the backgrounds to establish the mood. In total, “Rise & Shine” has 12 different backgrounds, not including the foregrounds.

The backgrounds were started as pencil sketches on A3-sized watercolor paper according to the layout in the storyboard. Before painting the sketches, I made color swatches beside every sketch to give me the idea of the color combinations. Proceeding to the next step, I colored the pencil sketches with watercolor paints and brushes. I’ve found that I’m more comfortable doing this manually with actual paper and watercolor than doing it digitally. Some watercolor techniques such as using salt to create rock textures were used in the process.

After the base color is completed for all backgrounds, I transferred them to computer with A3 scanner. I’m using Photoshop to adjust the color, add more contrast and texture. At this stage, I also added more details to enrich the visual such as shadows, rim lights, grasses on the ground, details on the trees and clouds on the sky. The same process also applied to the foregrounds. The process to finalize all of the backgrounds and foregrounds took 3 weeks to complete.



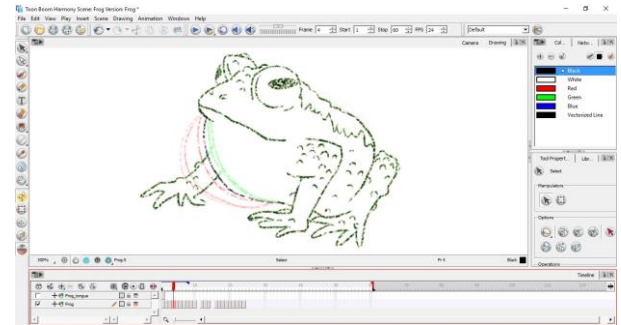
**Fig.8** Some of the traditional watercolor paintings and color swatches for backgrounds, scanned and transferred to computer



**Fig.9** Comparison of some of the backgrounds before and after digitally retouched in Photoshop

### 7-3 Frame-by-frame Animation

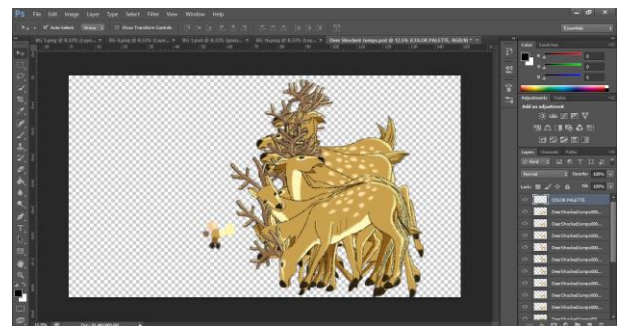
Roughs and clean-ups for the frame-by-frame animation of the characters were done in Toon Boom Harmony software. When animating frame-by-frame digitally in Toon Boom, I could easily flip between keyframes and inbetweens, then played the animation to see how it went. Fixing mistakes and adding inbetweens also took much faster than traditional animations. As for the outlines, I decided to use pencil stroke style to blend the characters with the backgrounds.



**Fig.10** One of the animating process in Toon Boom

Toon Boom is a very powerful software to draw 2D animations. However according to my experience, when it comes to colorization, the coloring style tends to be flat and the layers becomes unnecessarily complex. That was one of the reason why I chose to color the animations using Photoshop. After finishing all of the frame-by-frame animations, the sequences were imported to Photoshop as a stack of layers to be colored using Load Files into Stack script.

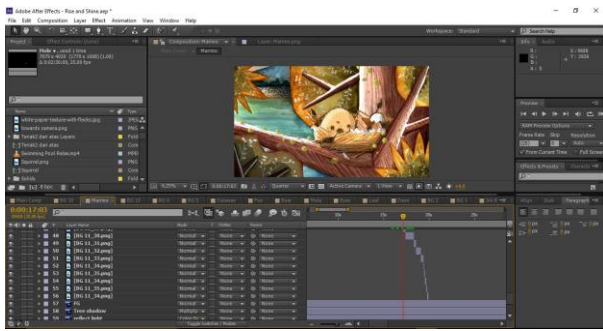
I stacked the background at the very bottom of the layers to make sure the characters and the backgrounds blend well together while making sure the characters are still distinguishable enough. In addition, I made a new layer at the top of every scene for color palette. For every layer of animation frame, I created new layer beneath it for coloring and merged them when it's done.



**Fig.11** One of the animation frames coloring process in Photoshop

When the coloring for one scene is completed, the file was saved as Photoshop file and imported into After Effects. I preserved the layers inside the Photoshop file so I can easily rearrange the frames and adjust the fps. Animation for lighting was done inside After Effects. The backgrounds and animated

characters were also composed in After Effects.

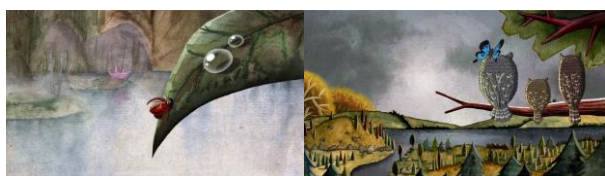


**Fig.12** Compositing of the characters and backgrounds were done in After Effects

Some of the stills from the finished animated short can be seen in **Fig.13**.

## 8 Screening and Evaluation

“Rise & Shine” animated short was completed at the beginning of November 2015. The short is 3 minutes and 9 seconds long. It was first screened in front of lecturers and other students in class. Then it was screened publicly at UTS Master of Animation & Master of Design End of Year Show in November 18-19, 2015, in Sydney, Australia along with other work.



**Fig.13** Some of the stills from “Rise & Shine”

After the screening, there were some feedbacks coming from lecturers related to the pace of the movie and the looks. The pacing feels flat so I needed to adjust the pacing for some scenes. As for the looks and mood, overall it successfully delivered the mood that I’m intended, it even almost feels ethereal at some point. However, I could make the visual looks better by not using black as the outline color.

## 9 Conclusion

This research has helped me understand the unlimited possibilities in animation production by trying an alternative animation pipeline that I’ve never tried before. This study tested alternative 2D animation pipeline which combining traditional and digital techniques according to their strongest points.

The strength of traditional animation is the feel of personal touch in the artwork comes naturally. Especially if you are after watercolor-style looks. It’s easier and faster to do it manually with real paper and paints than modifying digital paintings to look like watercolor paintings. Although some details could be added digitally afterwards. This technique was used for making backgrounds in the short.

By doing frame-by-frame animation digitally, we can save some time and resources by avoiding complex processes in drawing on papers and scanning or photographing them one by one to computer. We can bypass the process by drawing frames directly in computer with the help of animation software. It also makes revising process much easier. That’s why it was used in animating the characters.

“Rise & Shine” animated short which has around 3 minutes running time was done individually and completed in around 3 months of work. All things considered, it is safe to assume that this strategy has optimized the production time of 2D animated short “Rise & Shine” in achieving traditional watercolor look.

## 10 Possible Future Works

It is possible to develop this research further by adding more complexity to the project, for example adding more layers and camera movements to the backgrounds. We can also experiment with different kind of traditional media such as pastel and ink.

## Acknowledgements

The images and animated short presented in this paper is a part of my Master of Animation study in University of Technology Sydney, Australia. I would like to express my appreciation to my supervising lecturer Mr. Simon von Wolkenstein for his kind support during the making of this animated short. I would also like to thank UTS:Insearch and Multimedia Nusantara University for the support and for granting me a scholarship to study in University of Technology Sydney.

## References

- [1] O'Hailey, Tina, *Hybrid Animation: Integrating 2D and 3D Assets*, Focal Press, 2010.
- [2] Thill, Scott, *Toom Moore on "Song of The Sea", Reinventing 2D, and Dodging The Studio System*. Retrieved August 18, 2016, from Cartoon Brew: <http://www.cartoonbrew.com/award-season-focus/tomm-moore-on-song-of-the-sea-reinventing-2d-and-dodging-the-studio-system-107389.html>
- [3] Moreno, Laura, *The Creation Process of 2D Animated Movies*, 1st ed. 2014, p. 12 [Online]. Available: [http://www.edubcn.cat/rcs\\_gene/treballs\\_recerca/2014-2015-02-4-TR\\_baixa.pdf](http://www.edubcn.cat/rcs_gene/treballs_recerca/2014-2015-02-4-TR_baixa.pdf). [Accessed: 16- Aug- 2016]
- [4] White, Tony, *How to Make Animated Films*, Focal Press, 2009.
- [5] Klazema, April, *2D Animation: A Comprehensive Guide to the Fundamentals*. Retrieved August 18, 2016, from Udemy Blog: <https://blog.udemy.com/2d-animation-2/>. [Accessed: 18- Aug- 2016]
- [6] Sarrat, S. A. & Maria L. H., *How Computers Re-animated Hand-made Processes and Aesthetics for Artistic Animation*. Animation Studies Online Journal Vol. 7 [Online]. Available: <https://journal.animationstudies.org/sara-alvarez-sarrat-and-maria-lorenzo-hernandez-how-computers-re-animated-hand-made-processes-and-aesthetics-for-artistic-animation-2/> [Accessed: 17- Aug- 2016]
- [7] Fenlon, Wesley, *2D Animation in The Digital Era: Interview with Japanese Director Makoto Shinkai*. Retrieved August 16, 2016, from Tested.com: <http://www.tested.com/art/movies/442545-2d-animation-digital-era-interview-japanese-director-makoto-shinkai/>
- [8] Ye, Li, *Realization Approaches of Hand-painted Pastel Art in Animation*. Journal of Landscape Research Vol. 6, 2014, p. 46-48 [Online]. Available: <http://e-resources.perpusnas.go.id:2071/docview/1549924764/fulltextPDF/EAE476FD77984E0DPQ/1?accountid=25704> [Accessed: 20- Dec- 2016]
- [9] Language Arts editors, *Watercolor as a Form of Storytelling: An Interview with Jerry Pinkney*. Language Arts Vol. 91 No. 6, 2014, p. 449-453 [Online]. Available: <http://e-resources.perpusnas.go.id:2071/docview/1540088170/fulltextPDF/229B6993809841B0PQ/1?accountid=25704> [Accessed: 20- Dec- 2016]
- [10] Parker, Charley, *Gobelins Animation Students*. Retrieved August 16, 2016, from Lines and Colors: <http://linesandcolors.com/2006/06/12/gobelins-animation-students/>