Corrie Francis Parks.

Introduction

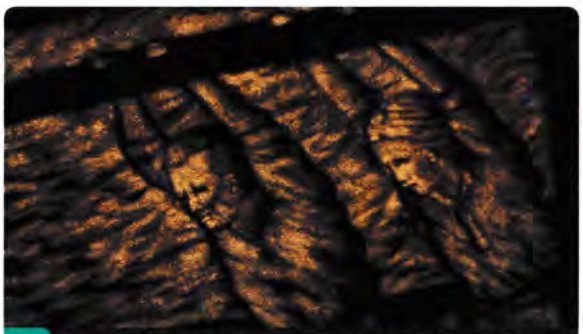
The Experimental Frame of Mind

Dirty Fingers in the Digital World

A word I have discovered in writing this book is "haptic." It might be my new favorite word. It means "of or relating to the sense of touch." This describes so well what is happening in animation right now. Artists across all mediums are returning to physical materials as the starting point for their work, boldly employing new technologies to traditionally hand-crafted methods of animating. Not only are viewers fascinated by the artistry of these techniques, but animators also value the haptic experience of working directly with the materials.

This book deals specifically with stopmotion animation techniques created with the haptic materials of sand, clay, and paint. We are about to make a mess, so expect to get dirty! This method of animating is done directly under the camera; every frame is created, shot, and then destroyed in the creation of the next frame. 01

Working this way requires confidence, intuition, and stamina. Even with the full benefits of digital technology, there is no easy way to harness the physical properties of sand, paint, and clay – the skilled brushwork of a painter, the sculptural eye of a clay animator, the nuanced manipulation of light by a sand animator are still necessary to push through the hours under the camera.



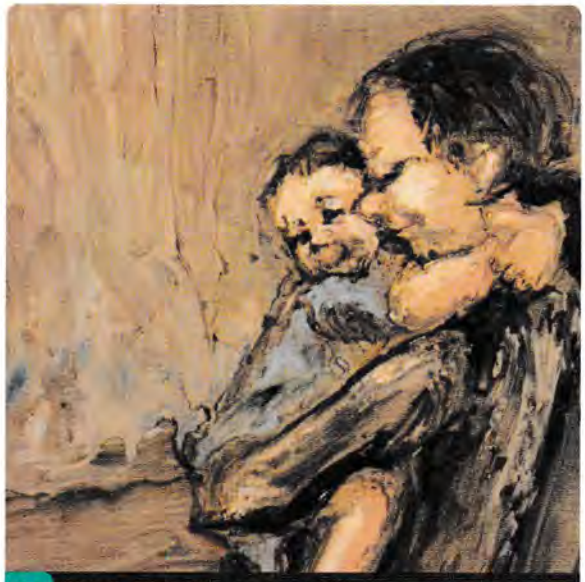
01 The Crossing – *Marieka Walsh (work in progress).*

What digital technology has done for under-the-camera animation is to facilitate bolder risk-taking by the creators. Gone are the days when animators would shoot a scene and send a reel of film off to the lab with fingers crossed. My first several films were made on 16mm and I remember nervously threading my footage through the projector, wondering if the days I spent in the camera room had produced anything useable. Now, with real-time feedback from digital cameras, I know immediately if a shot is not working and often have a chance to fix it before it is entirely lost. 02

Additionally, it seems like anything and everything can be animated. I've seen works animated on laser-burnt toast and a series of popping balloons. An entire beach might be a set for sand animation, or a bunch of scientists can move atoms to create the smallest animated character in the world. 03

In many films, the novelty of the technique trumps all, intended to surprise and dazzle an audience, gathering as many views as possible regardless of the content. Audiences are fascinated by the artistic process, and a work that involves moving individual grains of sand or shaping wet paint frame-by-frame holds infinitely more wonder than pushing buttons on a computer. (Anyone who has made a CG film knows that just as much time and artistry goes into a well-crafted digital image as any material-based animation. Unfortunately, public perception still sees CG as a shortcut to the time-consuming techniques. To overcome this misperception, many computer-based animators are striving to reveal the physical and artistic components that go into their work as well.) The commercial demand for animation that looks "new and different" signifies that the experimental process has become an essential part of a successful animated film. 04

Ultimately, the best works are those that use an innovative approach to production, and also relate to the message or emotional tone the film is trying to communicate. Then the audience is moved emotionally, dazzled visually, and the message, whether commercial or artistic, becomes memorable. The



02 The Ballad of Holland Island House (detail) – *Lynn Tomlinson – 2014.*

03 Bottle – *Kirsten Lepore – 2010.*

04 When I Was a Child – *Maryam Kashkoolinia – 2014.*

animations that will be shown generation after generation are those that marry innovative animation techniques with meaningful content.

In order to achieve this harmonious marriage of content and style, animators need to have an *experimental frame of mind*. "Experimental" is a tricky term when applied to animation. Some scholars and artists only apply the term to abstract, non-narrative films. Others use the term more broadly, applying it to animation that uses unusual or innovative production processes, regardless of narrative content. 05

For the purpose of this book, I prefer Jules Engel's definition:

> Experimental Animation is a personal vision – a concrete record of an artist's discovery of himself.[1]

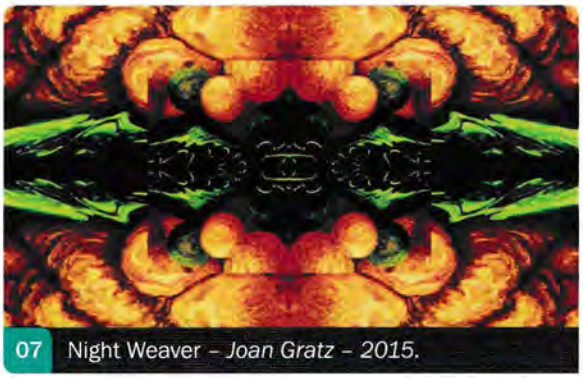
This removes the emphasis from technique and content and places it on the artist and his or her journey of self-expression. As with every field, those people with bold and often unconventional approaches to animation become catalysts for the slow-moving commercial industry.

Under this broad umbrella, a narrative-based paint-on-glass film, like Patrick Jenkins's *Labyrinth*, 06 and an abstract visual symphony, like Joan Gratz's Night Weaver, 07 can both contribute to the conversation that is changing the animation landscape. The overarching creative problem that every artist encounters in each new work is how to express their personal vision. The solution to this problem will come from applying creative thought at every stage of animation production. It may require building a special camera rig, like the one Clive Walley constructed for his abstract films. It may require finding a new material to work with, like the Ansorges did when they started working with sand, or it may require combining techniques, like Lynn Smith did with paper cut-outs and water-soluble crayons. 08 09

You can bring the experimental frame of mind to your narrative development, sound design, even the way you market and exhibit your finished work. Materials are just one aspect of the solution, and while this book will cover the production methods

05 Miramare – *Michaela Müller – 2009.*

06 Labyrinth – *Patrick Jenkins – 2008.*



07 Night Weaver – *Joan Gratz – 2015.*

unique to sand, paint, and clay, I hope it will also be the starting point for finding new avenues of self-expression through animation.

Why These Techniques?

Out of the myriad of approaches to experimental animation, why are we focusing on sand, paint, and clay in this book? Their similarities begin with the very nature of the materials. Sand, paint, and clay are materials that have both fluidity and dimension – working with them is like drawing and sculpting simultaneously. Because of their similar physical qualities, a similar working method applies to all three. These materials are animated under the camera, usually on a glass surface. 10 The animator creates one frame by shaping and drawing with the material, records the image with the camera, and then reshapes the materials to make the next frame. Each frame builds upon the one before and at the end of the process there is nothing left except the recorded images. There are no second chances with this type of stopmotion. Everything must be done start to finish, with no way to go back and correct a mistake once the frame has been destroyed. The added difficulty is that the fluidity of these materials make them notoriously difficult to control under the camera.

08 Fantasmatic – *Nag and Gisèle Ansorge – 1969. Courtesy of ASIFA Switzerland.*

09 *Lynn Smith combines paper cut-outs and drawing under the camera in her film* Pearl's Diner. (Pearl's Diner – *Lynn Smith – 1992.*)

10 *César Díaz Meléndez animating sand in his studio.*

If the thought of this makes your heart palpitate and palms sweat, you are not alone. Under-the-camera animation is a high-consequence art form and not for the faint of heart! It is a bold choice that comes from an explorative approach to filmmaking. The benefit of working under the camera is the opportunity for a spontaneous adventure. Accidents happen, which can lead to cinematic disasters or great visual discoveries. No matter what type of animation you ultimately choose, you will have many more opportunities to expand your avenues of artistic expression if you approach your art fearlessly! 11

Animators now have a host of new digital tools, which will enhance their practice. Technology has expanded the possibilities of working with these volatile materials. While under-the-camera animation still requires meticulous planning and execution, there is more maneuverability thanks to real-time feedback, digital capture, live-view shooting and post-production magic. What was once the realm of a few fearless pioneers has now become accessible for any animator with a sense of adventure.

Why This Book?

I know these things because I work in this world of fluid frames. I started my animation career shooting on 16mm film and bootstrapped my way through the transition to digital production. I also began animating as a traditional character animator drawing on paper. As my artistic goals changed, I began to work under the camera, eager for that physical connection with the material. I first discovered paint-on-glass animation, combining it with drawing on paper in my film *Ash Sunday* (2001). 12

Working in the immediacy of the moment was thrilling and stimulating. For my next film, *Tracks* (2003), I tackled sand, but with a particular artistic goal – color. Without digital tools, I had to figure out a way to add color while I was shooting. I discovered theater lighting gels could be cut and taped together into brilliant background scenery that kept the purity of the light coming into the camera. 13 14

For me, the problem-solving is a large part of my attraction to under-the-camera animation. Each film requires a period of research and the opportunity to create something never before seen. That is what keeps me interested – a chance to develop an experimental frame of mind. Both the previous films were shot on 16mm film, which presented a host of challenges.

Once I had fully transitioned to a digital workflow, those challenges were replaced with the new challenge of defining a hybrid handcrafted aesthetic. Though I work primarily with

11 *Sheila Sofian animating* Truth Has Fallen (Truth Has Fallen – *Sheila M. Sofian – 2013).*

12 *My first paint-on-glass film,* Ash Sunday (Ash Sunday – *Corrie Francis Parks – 2001).*

13 *Colored backgrounds for* Tracks.

14 Tracks – *Corrie Francis Parks – 2003.*

15 A Tangled Tale – *Corrie Francis Parks – 2013.*

16 *Animating sandy fish.*

sand, the experimental frame of mind has led me to animating paint, cut-outs, objects, drawings and computer-generated effects, as well as a host of other animation techniques. 15

The opportunity to develop fluid frame animation extends beyond just my own personal process. The artists featured in this book approach their projects with that same experimental frame of mind. My hope is that collecting their discoveries and methods alongside my own will further define and expand the way animation is created. Anything is possible; it is just a matter of how. 16

What Is in This Book?

This book will give you the foundation to achieve that "how." Section I will deal with production principles that apply to all these fluid frame techniques. You will find practical steps for developing an idea into a film, setting up your studio for under-the-camera animation, and some general animation techniques that apply to all types of fluid frame animation. Section II will delve into the specifics of sand, paint, and clay, including how to choose and work with your materials and how to transition from the physical process of creating frames to a digital workflow to enhance your animation. Anyone can jump right in and create animation with the introductory exercises – they require minimal equipment and an adventurous attitude. The more advanced compositing exercises do assume a basic familiarity with Adobe After Effects. If you need to brush up on your skills I would recommend finding a good introductory book or online tutorials that will get you comfortable with the After Effects interface and workflow. I also recommend reading through the digital methods for each material, as each chapter builds on the previous. For example, even if you don't plan to animate with sand, many of the basic compositing methods explained in that chapter also apply to paint-on-glass or clay painting.

This book also provides a historical context for inspiration and theoretical considerations for finding your best method of self-expression. These fluid methods of animating are most often relegated to a side note in history books and production manuals. Knowing the history and current

state of the art form is not only a source of inspiration, but also a method for learning. Many of the films mentioned in this book are readily available. Go watch them and ask yourself the question: "How did they do that?" 17

If you are new to filmmaking, this will take you through the entire process of creating a film, from concept to post-production and sending your film out to the world. For veteran animators, you will find mind-expanding creative exercises and a new visual language to apply to your experience. Scattered throughout are interviews and words of wisdom from some of the early practitioners, as well as practical tips from artists who are currently pushing the boundaries in these experimental mediums. I've interviewed over 20 animators working in these techniques; every one has a different approach to their work, and you will too. All I can do is get you started with the right equipment, materials, and some good advice. 18

There is great pressure in the film industry to be original, but originality always comes as a side effect of pursuing some other goal. Your starting point may be a conceptual idea, a narrative thread or an investigation into material properties, but it should always begin in authentic artistic expression. Caroline Leaf, who teaches animation workshops all over the world, has this observation,

> Original expression comes sort of naturally. I tell [students] to copy me, to look around and if you see anything good that someone else is doing next to you, to copy that too. I think you should copy the technique and then you make it your own. What you want to say will come out and it will be different than what anyone else wants to say.[2]

So view this book as a tool-kit of techniques that will aid you in finding an avenue for your personal voice. Some artists may find they intuitively

17 Méandres – *Florence Miailhe – 2013.*

18 Carmen Torero – *Aleksandra Korejwo – 1996. Courtesy of TV Studio of Animation Films Ltd. Poznan.*

19 **The** Old Man and the Sea – *Alexander Petrov – 1999. Image courtesy of Pascal Blais Studios. © 2001 Alexander Petrov.*

20 Ada – *Lee Whitmore – 2002.*

grasp animating in sand, while others may understand the nature of clay more easily. 19 Still others may find working under the camera far too uncontrollable to suit their artistic goals, and return to other forms of animation with a broader perspective. Wherever you fall after your sojourn into the world of fluid frames, developing an experimental frame of mind will ultimately lead to your most interesting work. 20

Notes

1 Engel, Jules. Joy of Movement. Center for Visual Music Online Library. Center for Visual Music, unpublished typescript, n.d. Date accessed: Mar. 16, 2014. http://www.centerforvisualmusic.org/Library.html

2 Leaf, Caroline. Telephone interview. Mar. 26, 2014.

Thomas Parks.

Chapter 2
Lights! Camera! Animation!

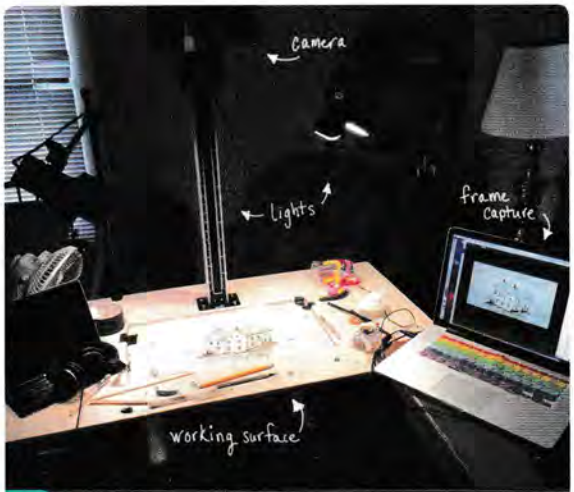
Setting Up Your Studio for Under-the-Camera Animation

Shooting animation under the camera means you will be spending a lot of time in your camera room. With that in mind, having a functional, comfortable workspace will help you create better animation. Naturally, not everyone has access to the ideal studio space. When I started animating, my first camera room was 4x5-foot closet in my bedroom and I still managed to maintain a very active artistic and commercial practice. 01

Since then, I have moved my studio several times, and I had to transform each new space into a place where my creative brain could focus and expand.

Here's a list of questions to ask yourself when setting up your workspace:

01 A closet is the perfect place for a camera room.



02 Lynn Tomlinson's living room studio. Courtesy of Lynn Tomlinson.

- Do you like to work standing up or sitting on a stool or chair?
- Do you need inspiring images covering the walls or does blank space keep you focused?
- Do you like to listen to music or podcasts while you work or is silence your friend?
- Does it help you to be surrounded by others while you are working? Does sharing a studio with another artist appeal to you?

A studio is an evolving space, and it will grow as you grow as an artist. If you find yourself stuck creatively, maybe it's time to rearrange the furniture, buy a new piece of equipment to play with, or visit other animators and see how they construct their space. Your studio should be both sacred and adjustable and, most importantly, a place you want to spend your time. 02

Practically, there are certain things you'll need to animate under the camera with the materials covered later in this book. These are:

- Working surface – table, light box, or multiplane setup
- Lights – top light, backlight, or both
- Camera – digital still camera, film, video camera, or webcam
- Frame capture software – not necessary but very convenient.

Working Surface

Just about every animator I talked to for this book has a customized animation table that suits their working methods. Each one brought the experimental frame of mind to the construction of their studio and figured out what special functions their vision required. The size and style of your working surface will vary based on your individual production needs, but at the very least you will want a table at a comfortable height with the capability of being lit from above or below. 03

The techniques in this book are often animated on glass or Plexiglas. Plexiglas is lightweight and inexpensive and has a very slight texture that some

paint-on-glass animators find helps paint stick to the surface. Glass is sturdier, resisting scratches from scraping palette knives or rubbing sand. For sand animators, glass also minimizes the static electricity that can build up on the surface and make the sand spontaneously jump out of place. For this reason most sand animators animate on glass. Other surfaces work as well. Patrick Jenkins paints on linoleum tiles because he likes how the texture interacts with the paint. Joan Gratz paints with clay on a masonite board. Some artists, like Alexander Petrov and Martine Chartrand, paint on clear, acetate cels taped to the glass so they can easily slide reference images underneath.

A sturdy piece of glass makes a great base for your working surface and you can always place a Plexiglas sheet or acetate cel on top. You can have glass cut to any size at a glass shop. For larger working surfaces, choose a fairly thick sheet of glass, at least ¼ to ½ of an inch. If you can afford it, get tempered glass, which is much stronger than standard window glass and doesn't scratch as easily. I have a tendency to lean on my table a bit while working and it would be tragic and dangerous if I fell through it! Pay a little extra to have the edges sealed (i.e. smoothed down) so you don't cut yourself while handling it, or you can tape the edges with strong masking tape. If you are working with top light, look for non-reflective glass (frequently used in picture framing). It is expensive, but you won't have to deal with tricky reflections from the lights and camera.

03 *The sand animation studio where I made* A Tangled Tale.

04 *The layered multiplane used in* Astigmatismo. *Courtesy of Nicolai Troshinsky.*

The Multiplane

If you are planning to work in layers, you may want to construct a multiplane, which is multiple layers of glass stacked under the camera. With a multiplane, you can separate parts of your animation onto the different layers so they don't intermingle. This is convenient if you have two colors you don't want to mix together, or if you have a background image that you want to keep separate from the foreground action.

A multiplane is a customizable thing. It can be as simple as propping up a layer of glass above your table, or as complex as Clive Walley's highly engineered 4D camera rig. Nicolai Troshinsky's multiplane stretched from floor to ceiling because he needed to manipulate the depth of field in *Astigmatismo*. Through trial and error, Troshinsky determined the distance necessary between each level to achieve the precise focus shifts between distant and close-up parts of the scene.[1] 04 05

05 *Troshinsky's multiplane stretched from floor to ceiling to enable large shifts in focus. Courtesy of Nicolai Troshinsky.*

Bernard Lajoie, technical director on Alexander Petrov's *The Old Man and the Sea* (1999), built a custom animation stand that would accommodate an IMAX camera. The stand had four glass plates that slid in and out like drawers. Petrov would make changes to the necessary level and slide the drawers into place, at which point an electric sensor would indicate they were back in exact alignment. Everything had to be perfectly precise because the slightest misalignment would be magnified enormously on the IMAX screen.[2]

If you wish to build a multiplane, start with something simple, like Tess Martin's homemade layering system. 06 Leave enough space between the layers so you can reach your hand in and make changes to the lower levels, if necessary. See what you can achieve with just two layers, and how your material looks when it is stacked. Once you have worked like this for a little while, you will learn what special modifications you might want. You may decide you need sliding mounts to pull out your layers, or a special lighting system to eliminate shadows. Your studio is your customizable workspace, so let it evolve with your production needs.

06 *A simple multiplane. Courtesy of Tess Martin.*

Lights

Top lighting is when light illuminates the top of the artwork. Backlighting is when the light comes from behind the artwork, creating a silhouette or backlit image. 07 08

Back in the days of film, lighting had to be very carefully calibrated with the correct film stock so the color and exposure would be accurate to life. Digital cameras give us much more flexibility with lighting because we can adjust the settings within the camera based on what lighting we have

07 The Safe House *by Lee Whitmore is top lit gouache – 2006.*

08 The Umbrella *by Xin Li is backlit oil paint – 2011.*

09 *These LED lights allow adjustments to the color temperature and brightness and give off little heat.*

available. LED lights are a less expensive and more energy efficient option to large studio lights. 09 10

A dimmer switch will allow you to precisely control the amount of light that goes into the camera. Check the specifications before installing one, as certain types of lights have special requirements. Some lights need time to warm up before they reach their full brightness, so turn them on while you are getting your supplies ready. You may not notice the difference with the naked eye, but the sensitive camera will!

10 *Nicolai Troshinsky mounted fluorescent bulbs on each layer of his multiplane to maintain consistent lighting on every level. Courtesy Nicolai Troshinksy.*

Top Lights

With top lighting, reflections off the glass can sometimes be a problem, which is why I recommend non-reflective glass. A polarizing filter on the camera lens will also help in eliminating glare, or you can add a touch of backlight. I have found that the combination of backlight and top light works very well for paint-on-glass and clay painting.

You will also need some sort of diffusion method to soften the light hitting the image and reduce harsh shadows. You can buy diffusion paper to go over the lights, use a professional softbox or try bouncing light off a piece of white foam core above the artwork. The farther back your lights are from the artwork, the more diffuse the lights will be. Of course more diffuse light also means less light on the artwork, so you will have to compensate for this with your exposure settings. 11

11 *Bounced light makes for an even illumination over the artwork.*

The standard light placement is at a 45° angle on either side of the image surface. Of course, this is just a starting point and you will want to make your own adjustments according to the effects you want to achieve. While I was shooting tests for *Ash Sunday*, I tried all sorts of lighting combinations to eliminate the shadow the paint cast onto the paper below the glass. Nothing worked, so I accentuated the shadow by using thicker glass and eliminating all diffusion. Then I wrote the shadow into the story as an additional character. 12

12 Ash Sunday – *Corrie Francis Parks – 2001.*

The Light Box

If you wish to have your work lit from underneath, the simplest solution is to buy a light box from an art supply or photography store. Look for one that

can provide a consistent diffusion across the surface, as sometimes the bulb will illuminate one section of the box very brightly and leave the rest in a dull, underexposed state. 13

At some point, you may find it more economical to build your own light box so you can have a larger working surface. There are a number of ways to do this, but the basic idea is to build an encasement for customizable lighting. Inside the box you can use linkable under-cabinet lights or strips of LEDs arranged to provide even illumination.

13 *Working on a manufactured light box.*

14 *A diffusion box under a glass table made from foam core and tinfoil. Large sheets of architecture paper are taped to the underside of the glass to provide more diffusion.*

If you are working with backlit techniques, you will need some way to diffuse the light as it comes through the glass so it spreads evenly and softly. Milk glass (also known as opal glass) is a white, opaque glass that provides near-perfect diffusion. However, it is expensive and hard to find. Other options include adhering white window privacy film to the glass or taping a few layers of translucent architecture paper on the underside of your glass. Bouncing and reflecting the light from underneath also helps create an even illumination. 14

Your studio needs will depend on your production and the way you like to work. Creativity doesn't end with the artwork; it is your tool for anything that gets in the way of your production. Don't be intimidated by construction projects; you can enlist help. Michaela Müller asked her father to help her build a camera and light box that could rotate as one unit so she could incorporate slowly dripping paint in her animation. 15

Robbe Vervaeke's grandfather helped him construct a metal-framed easel for his large-format paint-on-glass. Lynn Smith's custom 16mm camera stand, which she used to shoot several of her films, was designed and built by George Perkins in 1972, a master tinkerer who worked for the Physics Department at Harvard helping graduate students construct unique models in order to

"You need to be constantly managing your work area. If you don't, then you won't make animation. It can be cluttered and it can be dirty, but you need to be able to move stuff and change stuff, to move your lights and your camera, expand your work area. And if it doesn't work, do something else."

– Robbe Vervaeke

test their ideas. Later, Smith had the stand modified to accommodate a digital camera. We are not in this alone. Let your limitations be the reason to involve someone else in your production, for both you and your collaborators will find the experience full of unexpected rewards.

The Camera

The most common way to shoot animation is using a Digital Single Reflex Lens (DSLR) camera. It's also possible to shoot animation with a webcam, digital video camera, or even a phone. Don't let finances keep you from animating! Just start with what you have. 17

However, if you shoot with a DSLR, you will be able to fine-tune the image before the shoot and afterwards during post-production. In this section, we will go through some of the basics of choosing and adjusting a DSLR for under-the-camera animation.

A DSLR is made up of a camera body and a lens. A power adapter is a nice accessory to have for your camera so your battery won't die in the

15 *Michaela Müller's tilting camera. Photo by Corrie Francis Parks.*

Animated Anecdote

After hacking together my first sand table from a WalMart computer desk, I needed to build a camera stand. I headed to the local hardware store with a sketch of what I wanted and no idea where to start. The lady at the front counter sent me upstairs to consult with Max (aka MacGyver). He took one look at my sketch and got this twinkle of glee in his eye and off we went on a whirlwind around the hardware store collecting items and consulting with several other employees along the way. I could tell they were attacking the problem with as much creative gusto as I brought to my films. I ended up constructing the camera stand out of some discarded 2x4-foot scraps, steel plumbing parts (I now know what a flange is for), and a few nuts and bolts. On my last of several trips to the store, I brought a thank-you note and a big plate of cookies for all the employees that took on such an unusual creative problem with such enthusiasm. 16

16 *My first homebuilt sand table.*

17 *A phone camera stand in use at an animation workshop for teachers led by Diane Kuthy and Lynn Tomlinson at Towson University. Photo by Hannah Simms.*

18 *A Canon DSLR set up for shooting animation.*

middle of a shot. You will need a cable to connect the camera to the computer as well. Check with the camera's manufacturer to find out what kind you will need. The brand of your camera doesn't matter, but there are some features to look for when choosing a camera body. 18

Image Resolution

All cameras have a maximum resolution for the images they capture. Usually an image captured by a DSLR will be at a much greater resolution than one from a high definition video camera, which might shoot in full HD (1920x1080 pixels) or even 4K (3084x2160). High resolution images give you options for digital manipulations. For example, if the final format of my film is full HD and my camera shoots an image that is 5184x2986, I will be able to zoom into the image 2.5 times and not lose any image quality. However, if my film is 4K resolution, I will be able to zoom in much less before the pixels become visible. If you are using a webcam or digital video camera, pay particular attention to the image resolution. Many modern cameras are able to shoot in high definition (1920x1080) but also have lower resolution settings. Always capture at the highest resolution possible because it is much easier to scale down an image than to scale it up. Of course, there is a tradeoff: The bigger the image resolution, the larger the file size. You will need more storage space and processing power on your computer to work with the footage. 19

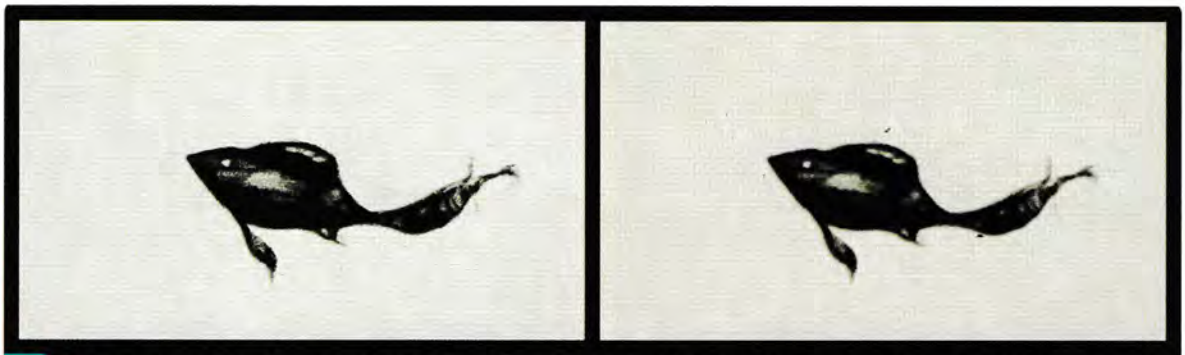
Most DSLRs have the option to shoot in RAW format. A RAW image file has not been processed and has the most information available in each pixel for digital development. Different camera brands have their own internal processing methods for making JPEG files in the camera, but a RAW file allows you to determine the development

#ProTip *ALWAYS back up your footage and project files on an external storage drive that you keep in a safe place away from the computer! In the event your computer breaks down, or is stolen or damaged, you at least won't have lost the hours you spent under the camera.*

settings for the sequences. Shooting in RAW format results in bigger file sizes, but you have the option to take the images into programs like Adobe Lightroom or Photoshop and adjust nearly every setting, even after you have shot a scene. If you get your exposure perfect when you shoot, it is not necessary to shoot in RAW, so that can save you a lot of file space over the course of a film. However, if you like to manipulate the exposure, white balance, saturation, or sharpness of your images, RAW files are the better choice. Because I do a lot of post-processing to my sand footage, I almost always shoot in RAW and batch process each sequence in Lightroom.

The Lens

The lens you choose will affect how your final image looks more than the body of the camera. All the light, color, and dimensionality of the world around us must pass through a series of glass layers before it is recorded on the camera sensor. The higher quality the glass and engineering with that process, the more true to life those digital images will be. 20 When you are spending your creative energy animating worldly



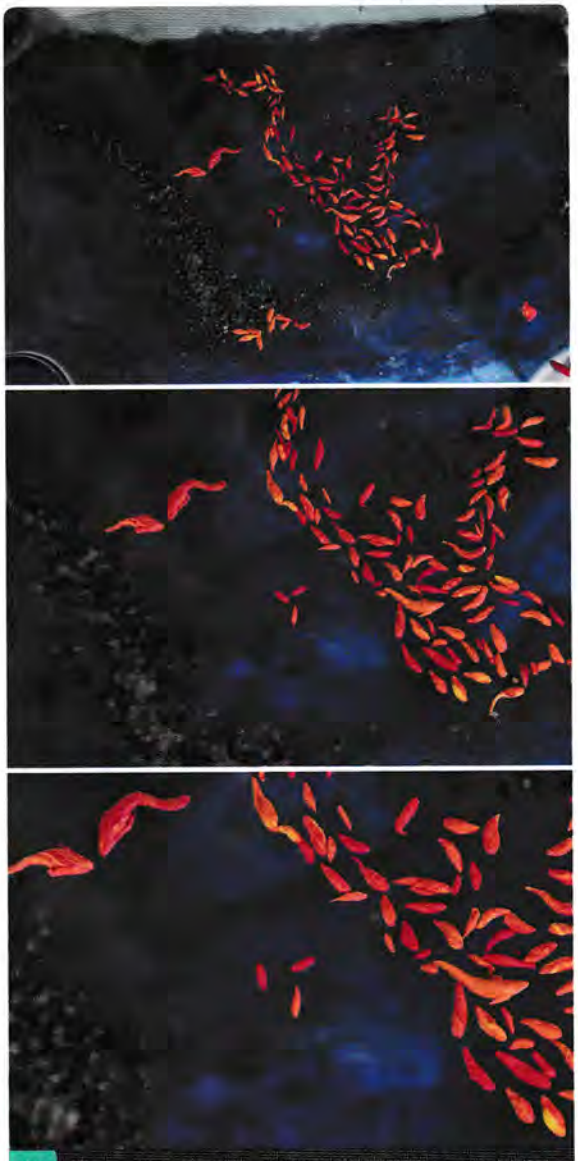
19 *The image on the left was shot at 5184x3186, the image on the right at 720x400 and was scaled up 750% to match the size of the first image. You can see the noticeable difference in sharpness.*

20 *Different lenses provide different optical properties.*

materials under the camera, each frame is a work of art, so if you are going to spend some money somewhere, spend it on your camera lens. Here are some things to consider when choosing a lens.

Focal Length: Fixed or prime lenses come in many different focal lengths (e.g. 28mm, 50mm, 80mm). The focal length is the distance from the lens to the sensor in the camera. A smaller number (i.e. 28mm, wide angle) means the lens has a wider field of view; more of what is in front of the camera will fit within the frame. A longer focal length (i.e. 200mm, telephoto) means a narrow field of view, and you will see only a small portion of what is in front of the camera represented on the frame. 21

Many DSLR cameras are sold with some sort of zoom lens. Zoom lenses have a range of focal lengths (e.g. 18–200mm) so you can choose to have a wider or narrow field of view. The flexibility of being able to set your own focal length is useful, but in exchange for this flexibility you will sacrifice sharpness and clarity in your image. Additionally, when the camera is mounted with the lens pointing down at the table or floor, gravity will want to pull the lens out to its fullest zoom. For professional projects, it is better to have a fixed lens and be able to adjust the height of the camera above your working surface.



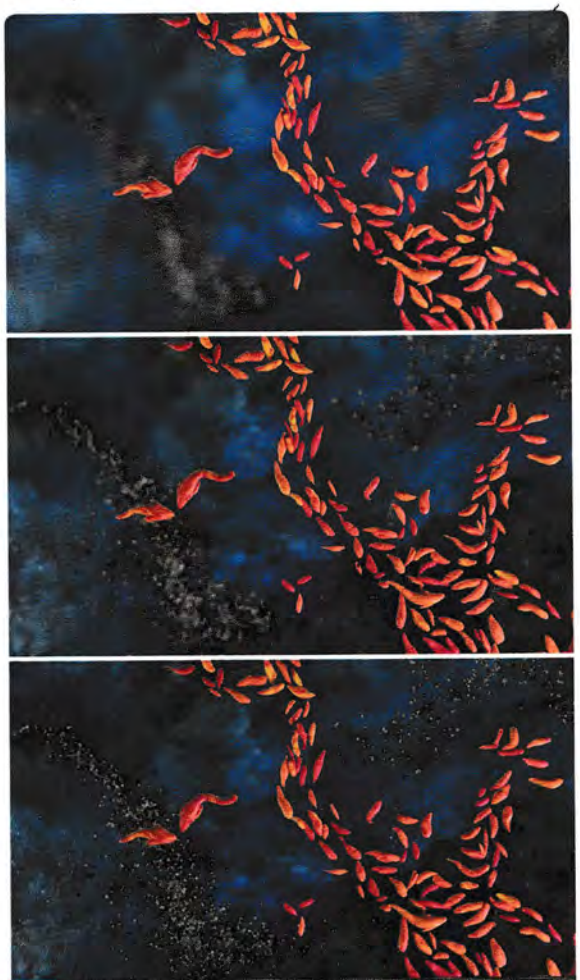
21 *Artwork shot with a 28mm (top), 50mm (middle), and 120mm (bottom) lens. The longer the focal length of the lens, the smaller the field of view.*

Depth of Field: The difference in focus between the nearest and furthest object in the field of view is called the depth of field and can be manipulated through the aperture settings on the lens. This f-stop setting is the ratio between the width of the lens and its focal length. Changing the f-stop (e.g f/1.8, f/4, f/22) changes the width of the opening and thus affects how much of our scene will be in focus. For example, if your f-stop is set to f/22 and you focus on an object very close to the camera, the objects in the background will also be in focus. If the f-stop is set at f/1.8, then only one part of the foreground image will be in focus and the background will be very blurry. 22

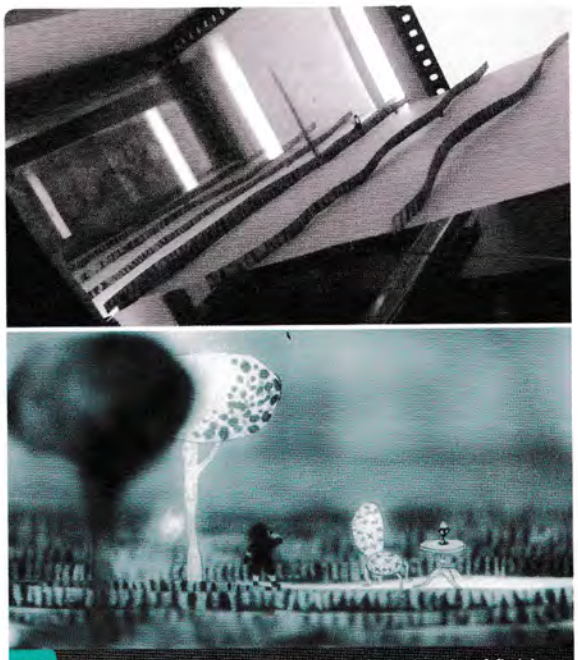
#ProTip *Some lenses have an image stabilizing feature. Be sure to turn this off when you shoot animation because the stabilizer will cause slight changes in the alignment, resulting in jittery footage.*

This is particularly important to keep in mind when working with multiplane setups, because you may want to have only one layer in focus and the others out of focus. In this case you would use a wide aperture like f/1.8 to give you a shallow depth of field. Or you may want every layer in focus, in which case you would need a very narrow aperture like f/22. Nicolai Troshinsky used this to his advantage in *Astigmatismo*. This short about a boy who loses his glasses masterfully plays with depth of field. Troshinsky shot the film on a five-layer multiplane setup with carefully planned shifts of focus to leave the audience feeling disoriented like his character. He used a Canon EF 85mm f/1.2 lens, which gave him an extremely wide depth of field. 23

Every lens has a sweet spot where the image is at its most sharp and clear. Usually, this is somewhere in the middle of its aperture range. Photographers will conduct a series of focus tests through an aperture range to find the sweet spot on



22 *A multiplane scene shot with different f-stop settings: f/2 (top), f/8 (middle), and f/22 (bottom). Note that with the widest aperture (f/2) only the foreground is in focus, while with the smaller aperture (f/22) both the foreground and background are in focus.*



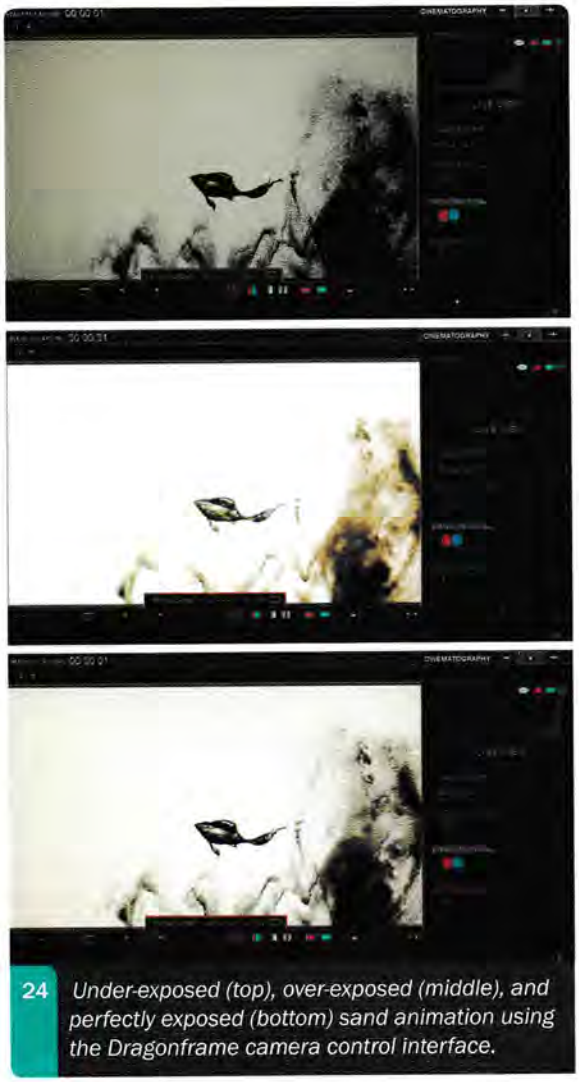
23 *Nicolai Troshinsky uses a shallow depth of field to great effect in* Astigmatismo. *(Astigmatismo – Nicolai Troshinksy – 2013.)*

a lens. Unless you have a specific reason for working on the widest or narrowest settings, keep your aperture set as close to the sweet spot as possible.

Setting the Exposure

Another benefit of a DSLR over webcams and point-and-shoot cameras is you have very precise control over how you expose the image, which is a balancing act between aperture, shutter speed, and ISO. These three settings are all related to how much light passes through the lens to the camera sensor and determine how light or dark the image is.

Aperture: We discussed the fine details of aperture when we picked out our lens. Here is where your aesthetic tastes come into play, so we will set this first. Determine what you want in focus, then set the aperture to achieve the desired depth of field. If you are shooting on just one level and don't need to worry about depth of field, set the aperture in that sweet spot for your lens to get the sharpest image and to avoid any vignette.



24 *Under-exposed (top), over-exposed (middle), and perfectly exposed (bottom) sand animation using the Dragonframe camera control interface.*

Shutter Speed: Shutter speed is how fast the camera opens and closes to allow the light to hit the sensor and create an image. You can make the shutter speed slower and allow more light onto the sensor, or faster and allow less light in. Always use a remote or a keystroke to activate the shutter on your camera. Pressing the shutter button with your finger will create a slight movement in the camera and cause jitter in your final animation. If your camera is mounted securely on a tripod or camera stand, you should be able to have a fairly slow shutter speed without risking a blurred image. However, if the shutter speed is very slow, you might notice some digital artifacts called "noise" in the final image.

ISO: ISO used to refer to the film speed, i.e. how much light was required to expose a piece of film. Now there is a digital equivalent. If you need a faster shutter speed and don't want to change your aperture settings, you can increase the ISO. The tradeoff is that a high ISO can create noise in an image, which may not fit your aesthetic. The ISO is something you would change only if you can't make the shutter speed and aperture setting work together. Keep your ISO around 100–200 if possible.

Take some test shots, changing the shutter speed, aperture, and ISO until you find an exposure that accurately represents your artistic goals. You will need to test your exposure for every scene, particularly for backlit work. A scene with a lot of white will need to be exposed differently than a scene with a lot of dark colors. 24

Frame Capture

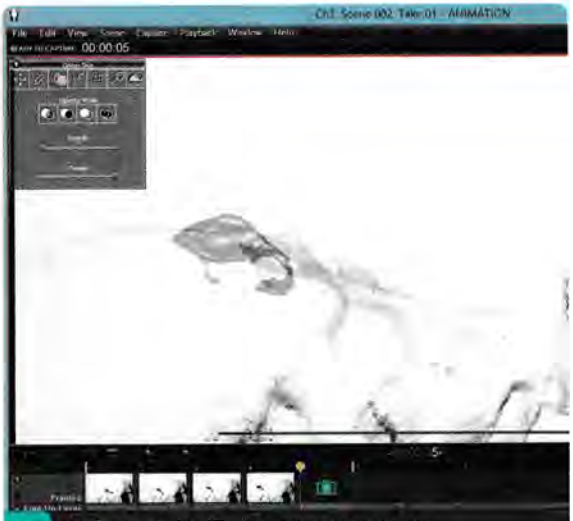
Once you have your working surface, lights, and camera arranged, the only thing left is a way to get the frames you record into the computer. Your digital camera can capture a sequence of images and you could download them after you finish shooting. However, there are several software programs on the market that will let you view a live feed from your camera while you are animating, which will make your life infinitely easier! There are many out there, some free or inexpensive and some professional grade with professional prices. These are some of the essential and convenient functions you will want to have in frame capture software:

- Live View: You can see what the camera is seeing on the computer.
- Onion-skinning: You can see previously recorded images superimposed on the live image. Very handy to keep your movements between frames uniform and forms accurate. 25
- Video Playback: While animating, you can play back what you have recorded and see how things are going.
- Frame Export: Once you are done animating, you can export your work in a useable format for future editing, like an uncompressed video file or frame sequence.

Other great features to look for:

- Camera Controls: ability to adjust camera settings, exposure, and focus
- Motion/Control/Lighting Controls: control studio lights and motion rigs for complex shots
- Rotoscoping or Reference footage: you can load an image or movie and see it over the live feed as a reference for your animation.

Most programs will let you download a trial version before you pay so always try before you buy! Check that you like the user interface and that your camera is compatible.



25 *Using a guide layer and onion skin in Dragonframe software.*

Additional Advice

The benefit of this book is it is a collective repository of what many animators have learned through experience. Most of them have figured it out as they go along. Here's a host of things that I would have loved to know when I started working under the camera.

Lock It Down

Weight and lock down everything that could get moved while you shoot. There's nothing more frustrating than accidentally bumping the table in the middle of a scene and throwing the alignment with

the camera off. Even worse is having a wobbly camera stand that makes the shot jitter. Tape the legs of your tripod to the table or floor and weight the center column with sand bags or bolt your camera mount to the wall. I also use tape and sticky tack to attach my light box to the table and brace the table against a wall to minimize any movement.

Leaving a "hot set" means leaving in the middle of a scene because you need to sleep, eat, or just go outside and breathe some fresh air. When taking a break, protect your work by placing a large sheet of foam core or an extra plate of glass over your working area to protect it from curious fingers or bits of dust. When you get back, let your lights warm up for a while before you start to shoot and always double check the exposure and framing in case something has shifted while you were away.

Staying Healthy Under the Camera

Because of the long hours, animating under the camera can take a toll on your health and wellbeing. Here are a few things to keep you feeling good throughout the process.

- Make your work table at a comfortable height so you don't have to bend over much. I stand on an anti-fatigue mat while animating, which keeps me from getting leg cramps and backaches.
- Set a timer to go off every 30 minutes. When it goes off, stand up, walk around the room, wave your arms, look out the window at something far away, do a toe-touch and some arm circles, then get back to it.
- If you are using backlighting and are staring into the light for long hours, get some lightly tinted glasses to protect your eyes.
- Use a dust mask if you are working with very fine grain sand, pastels, or other dusty materials.
- Make sure you have proper ventilation, especially if you are working with oils and turpentine.

Animated Anecdote

While working on Truth Has Fallen, *Sheila Sofian stepped away from her paint-on-glass for a moment. When she came back, she found her cat, Diva, had wandered across her painting, leaving paw prints in the wet paint. She now uses a wire covering to protect her work from curious cats!* 26

26 *Sheila Sofian's cat protector. Courtesy of Sheila M. Sofian.*

Keeping Things in Perspective

Inevitably in the middle of a shot there comes a moment when we wonder what we have gotten ourselves into. Destroying and reconstructing each frame seems like an endless process and we wonder why we decided to have so many things moving! Ultimately, we ask ourselves, "How long will this take?"

You are not alone! Here's an anecdotal comparison of the pace at which the stalwart animators in this book work:

- On *Soup of the Day*, Lynn Smith could spend all day on one image when the image contained many characters or was part of a complex drawn camera move (or both!) When working on *Pearl's Diner* with paper cut-outs and water-based Crapas crayons, she averaged five to six images in a day. 27

- On the more complex shots in *MacPherson*, Martine Chartrand would be able to finish four to eight painted images a day. Sometimes creating the backgrounds would take her an entire day.
- Joan Gratz's pace for her clay painting varies from less that 1 to 12 images per day.
- When animating a single fish swimming in *A Tangled Tale*, I could sometimes complete 100 images in a day. But on a more complex image, like the moving portrait of Darwin and his owl for the documentary *Seed*, I barely managed 20 images in one day.
- On the opposite end of the spectrum, Robbe Vervaeke will complete 60–120 images of painted animation a day, depending on how complex and detailed the scene is.
- Shira Avni's personal record is 200 images in one day! "But," she says, "I was doing something very simple." Usually she averages between 5 and 20 images per day.

27 *Many characters to animate in Lynn Smith's* Soup of the Day. Soup of the Day *©2013 National Film Board of Canada.*

Because this moment of fatigue will inevitably come, we must prepare mentally as well as physically. A good part of our mental preparation comes from that rehearsal time mentioned in the previous chapter. Playing develops fluency in our chosen technique so when we do sit down to create our final work we can better achieve "a state of flow." This is a state of mind frequently referred to by athletes, artists, or other professionals, when they are fully immersed and focused on their area of expertise.

Sometimes it's enough to just know what to expect and have a plan, like Shira Avni's preparations for a long shoot: "I prepare myself with music that will inspire me for long hours, food, cut off the internet access, and plan an open schedule that allows for a long day (and often overnight) of work."[3] 28

Michaela Müller prepares for each scene by spending time visualizing. Using her storyboard as a guide, she mentally watches each shot in her mind:

> With *Miramare* . . . every day, when I went to bed, when I woke up in the morning, I stayed with my eyes closed and tried to watch the film. I tried to learn the film by heart and then watch it and feel it. That's how I then improvised it . . . It's like meditation – I get distracted all the time, it's very hard![4]

28 *Shira Avni working with backlit clay under the camera. ©2006 National Film Board of Canada. Photo credit: Caroline Hayeur.*

Added confidence can also come from constructing references. 29 Lee Whitmore created three-dimensional models of the dining room in *Ada* (2002). Since the room was so important to the film, she needed to draw it from every possible angle. When it came time to do *The Safe House* (2006), she took the same approach, making a model of the street where the story takes place. Alexander Petrov filmed and sketched his father-in-law as a model for *The Old Man and the Sea*: "Using living people whom I know well and love, these people with their personalities, help me to make the personalities of my painted characters believable. This is the case for practically all of my films."[5] Using familiar faces as the basis for his characters gave Petrov an added motivation and emotional investment in the hours under the camera. 30

Pacing yourself is also important. Martine Chartrand received some very good advice from Petrov in her early days of animating: "He said to me, 'Now you have to work with the hardest of your scenes first and make it very complicated. Then you will understand the difficulty of animating and push yourself not to be comfortable with the easy scenes.'"[6] While working on the most complex scenes at the beginning of your production may feel like jumping into the deep end, taking the plunge will increase your learning curve and make the entire film better. If you know a particular shot is going to be a massive undertaking, do it early in the production when you have energy and enthusiasm and time to address the challenges.

Chartrand also observes:

> persevering is not the problem . . . it's overcoming the feelings of isolation . . . I created my films *Black Soul* and *MacPherson* under a 35mm camera, without any computer. Animating under a 35mm camera, 10 hours per day for years, demands great concentration, and circumstances dictate that I work alone . . . I am not connected to the virtual world of communication . . .[7]

29 *Lee Whitmore's 3D model of her childhood neighborhood and the resulting still from* The Safe House, *2006. Courtesy of Lee Whitmore*

30 *Alexander Petrov studied reference footage extensively while making* The Old Man and the Sea. *He filmed his father-in-law as model for the old man's actions. Courtesy of Pascal Blais Studio.*

The demands of the outside world may be a distraction you need to avoid, or it may help you with your production. Lynn Tomlinson says that sharing her work over social media helped motivate her to complete *The Ballad of Holland Island House* (2014):

> My research, my working relationships and network of artists that give me feedback and encouragement are digital and online. That's how I motivate myself. I would say to myself, "Okay, if I can do one second, I'll let myself post a still and people will give me likes and then I will feel encouraged to continue."[8]

The key to maintaining your energy and motivation through an entire production is having a balanced life. Be sure to spend time away from your work with friends and family, or rent a studio space in an area with other artists so you will occasionally have a built-in opportunity for social interaction. Maintaining a good mental attitude is just as important as staying physically healthy!

We want to step into the spotlight of the camera with as much preparation as possible, so we can animate with confidence. Every animator will have a different comfort level with the uncontrollable aspects of these materials. Some we can eliminate through our preparations, and some we must simply embrace as part of the under-the-camera method. There may seem to be mountains of preparations and mounds of uncertainty ahead. Immersed in your production, if you find yourself in need of encouragement, remember the words of Martine Chartrand,

> More than anything, you feel very spoiled taking so long to work on your film . . . you want to finish your film as quickly as possible, and in the best possible way, and still manage to maintain the fire of inspiration. All that is very hard and it makes you want to leave the ring. But you can't. You have to hang on, to make people dream.[9] 31

31 Black Soul *by Martine Chartrand ©2000 National Film Board of Canada.*

Notes

1 Troshinsky, Nicolai. Telephone interview. Feb. 20, 2014.
2 Cotte, Olivier. Secrets of Oscar-winning Animation: Behind the Scenes of 13 Classic Short Animations. Amsterdam: Elsevier/Focal, 2006, p. 208.
3 Avni, Shira, Telephone interview. Oct. 24, 2014.
4 Müller, Michaela. Personal interview. Mar. 20, 2015.
5 Alexander Petrov: The Making of "Mermaid" and "The Old Man and the Sea." Dir. Alexander Petrov. Panorama Animation Film Studio, c. 2000. Dailymotion.com. Subtitles in English by Niffiwan.
6 Chartrand, Martine. Email interview. Jan. 11, 2015.
7 "MacPherson: A Film by Martine Chartrand." MacPherson Press Kit. National Film Board of Canada, n.d. Date accessed: Mar. 28, 2015. http://martinechartrand.net/medias/MacPherson_PressKit.pdf

8 Tomlinson, Lynn. Personal interview. Oct. 13, 2014.
9 "Martine Chartrand: Visual Artist-Filmmaker." MacPherson Press Kit. National Film Board of Canada, n.d. Date accessed: Mar. 28, 2015. http://martinechartrand.net/medias/MacPherson_PressKit.pdf