

MaxFunCon 2013

**Crash Course On Independent Animation**

With Dan Henrick





## Introduction from Dan

Hey there! I just wanted to thank you so much for taking this course. I really hope you enjoy it, and get something out of it. I'm a huge fan of Maximum Fun and the MaxFun community, and it's a real honor and pleasure to be sharing this time with you. (On a bit of sidenote: My wife and I were at the first MaxFunCon in 2009, so it's a real treat to be presenting on a topic I love for people that I know are cool and creative.)

This book was written specifically for you, the MaxFunster. I want you to be able to follow along with this process without having to take copious notes (maybe just notes here and there if you like), and then be able to replicate this process at home if you so choose. I don't expect all of you to go home and start making animated shorts immediately, but I sincerely hope that some of you consider it. It's a lot of work, but it can be so, so rewarding.

In this class, we're going to cover the fundamentals of animation, as well as techniques for both hand-drawn animation, and tween-based computer animation. We'll spend some time talking about Flash and After Effects as tools for animation, but there are so many other ways to animate. Simply in regards to 2D animation, there are options like ToonBoom and Anime Studio, as well as Cinema4D and After Effects. The reason I've chosen Flash and After Effects is simply because they are the granddaddies of this sort of animation software, and they are still widely used. Plus, the process is generally the same between each of these programs - it's just the nuances that are different. If you go home and play with a demo copy of Flash and enjoy it, you might want to look into subscribing to Creative Cloud or downloading a demo of ToonBoom as well.

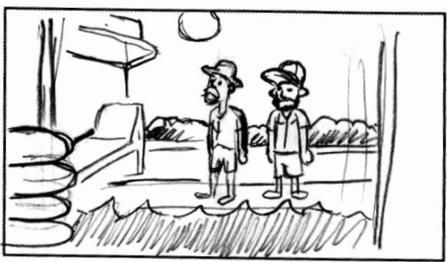
This booklet is going to assume that you already have a script written and the dialogue from it recorded. If you are new to animation, I'd recommend limiting your first short to under 3 minutes, just to make things easier on yourself. Personally, I've found that experiments are more enjoyable if they are short. That way, if it's a positive experience, I'll want to continue that idea into a new project. And if the experiment leads to a dead end, well, at least it was only a short detour.

By the way, I'm going to post all of these materials on my site in a subdirectory here... <http://danhenrick.com/maxfuncon2013>. If you want to review the actual Flash files or graphic clips, they will be available to you there to download. Also, if you have any questions after you take this home, please feel free to contact me at [dan@catsuitstudios.com](mailto:dan@catsuitstudios.com).

Ok, so let's say we've got our script and our dialogue together. Turn the page, and let's get started!



as I was like "Ah, more whiskey."  
Cut to Kyle pouring himself another glass of whiskey.



I had another friend passing through and we'd be by the pool  
Zoom in on whisky glass with a crossfade to Kyle and friend at pool.



The headliner's out there  
Headliner enters from the left, wearing robe and swim trunks.



and he's like, "Yeah! Check out all these girls..."  
Headliner raises arms



and it was clearly, it was like a... it was like  
Zoom out to reveal silhouettes of girls



An early high-school or junior high volleyball team that was there.  
Zoom out more, and silhouettes are revealed to be 12-year old girls.

# Storyboarding

Okay, so we have our script together and the voice talent recorded – the first step is storyboarding. Storyboarding is so very important to the animation process. If you're anxious to jump right into drawing characters or backgrounds, stop and take a breath. You will save yourself from many nights filled with headaches and confusion if you simply lay out some rudimentary storyboards first. Storyboarding allows you to determine pace, shot composition, transitions, and even lighting right at the outset of the process. It will also help you decide how to allocate your resources, and which sections of your film will need the most amount of labor. Here's how I prefer to storyboard...

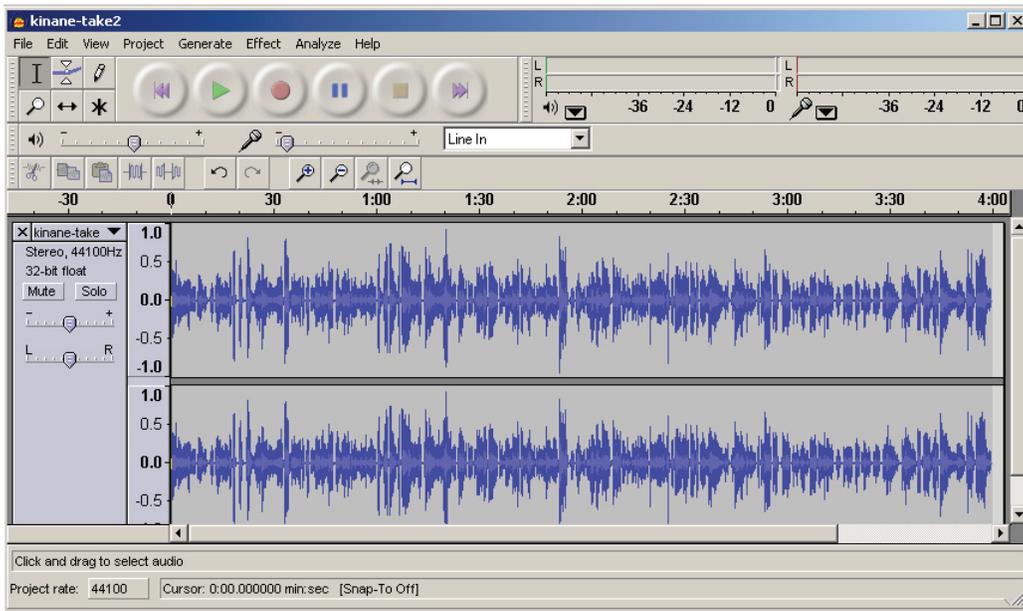
- 1) Print out 20 sheets of storyboard templates ( They are posted at <http://danhenrick.com/maxfuncon2013> ) and queue up a rough cut of your VO audio on your iPhone or laptop.
- 2) Listen to your recording, being mindful of where there are pauses in the actors' sentences or actions. We will eventually be editing the dialogue into manageable chunks of about 2 to 6 seconds. Start thinking about where the edit points might be (preferably not in the middle of a sentence).
- 3) After listening to a few lines of dialogue, think of how you want to represent the action visually, and where you would like to cut to a different shot. If you want the short to be dynamic and exciting, try to cut to a different shot after a line or two of dialogue, unless it's absolutely necessary to maintain a shot.
- 4) Start drawing thumbnails in the boxes, and adding dialogue and director's notes for each shot. You can make these as rough as you like, so long as you can recall your initial thoughts later when you are animating. (You might need to flesh your storyboards out more if you're answering to a client. Some clients will want to see your storyboards, but most understand that storyboards are rough works-in-progress.)
- 5) Stop the audio frequently as you work your way through the drawing process. If you hit a wall, rewind and re-listen to the dialogue a few times until you figure out how to frame your scene. Continue like this until you finish storyboarding your short.
- 6) Once you're finished, read through it a few times to make sure you're happy with your results. Also, start to look at which shots look similar. Could you re-use character drawings? Are there enough variations in shot structure to keep the viewer interested? Which sections have the most action (and therefore might be the most labor-intensive)? If you are working with limited resources, where can you make some cuts to the action?

One last note about the importance of storyboarding: Frequently while I'm working on a short, I'll hit a wall on a particular scene or transition. Maybe I decide that I don't like the way a shot is composed or I'm afraid that I might be repeating myself, and I'm stumped. It's much better to try to solve these issues prior to the animation process. When you're in pre-production, you are still thinking about the short as a whole, and whether each scene fits tonally and rhythmically with the rest of the piece. When you start animating, you will eventually get tunnel vision while working on certain labor-intensive scenes, and it's harder to make important, broader decisions in that headspace.

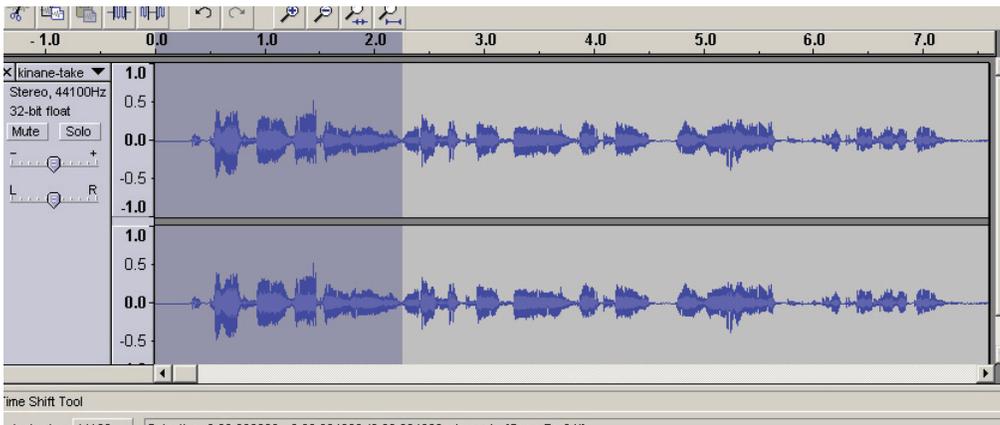
# Preparing Your Audio for Animation

Once we have the storyboards finished (and approved by the client, if need be), our next step is to prepare your rough cut of the dialogue to be imported into Flash. This means separating the lines of dialogue into short manageable audio files. Feel free to use any audio editing software that you prefer, as long as it exports to a WAV or MP3 format. GarageBand is one option. For the purpose of this demonstration, I'm using Audacity, which is freeware.

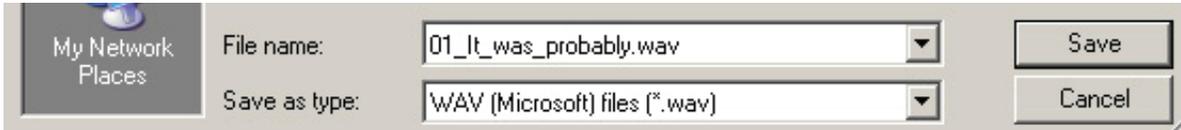
Import your full rough cut of the dialogue into Audacity.



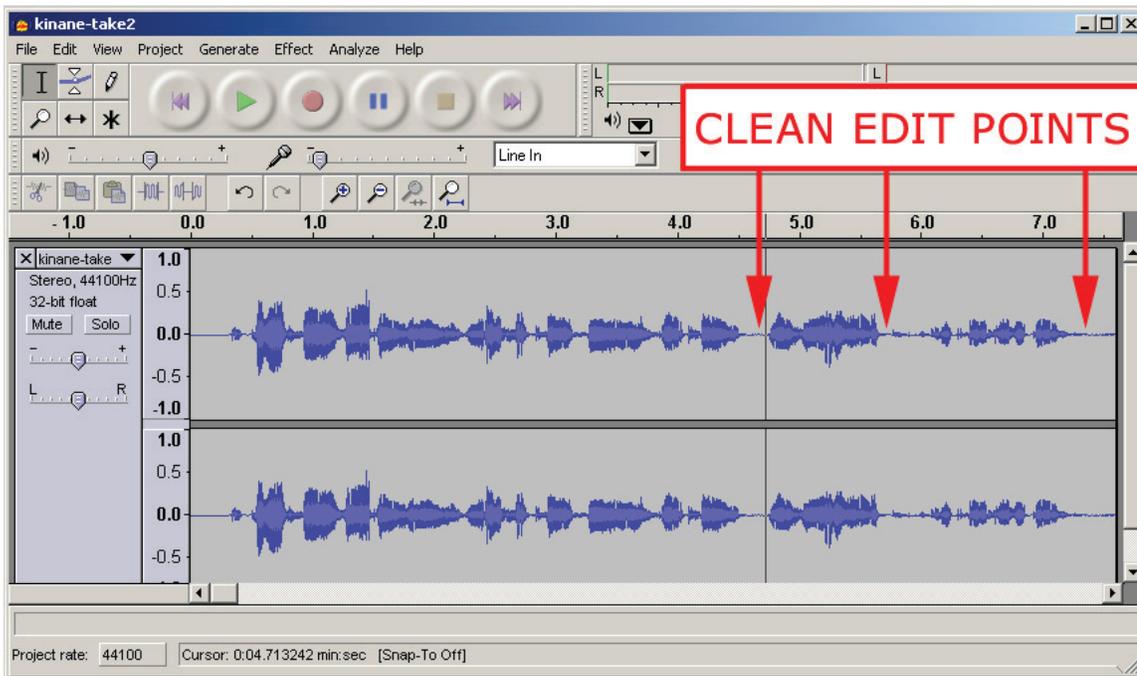
Take out your storyboards and look at the first line of dialogue. Listen to the imported audio file. Use the Zoom Tool to magnify the sound wave. Select that first line of dialogue with your cursor. Try to make sure that you are selecting a clean edit - one that's not in the middle of a sentence or an intake of breath.



Go to “File” >>“Export Selection as WAV”, and save out your excerpt. I like to include the numerical order of the dialogue along with a dialogue sample in my naming convention. (For example, the file name for the first line of dialogue in this short is called “01\_it\_was\_probably.wav”) Numbering your audio files is important, and it will be very helpful later when you’re trying to keep your assets organized.



Continue on to the next line of dialogue and repeat the process. If you have trouble finding a clean edit point after a particular sentence, try selecting a larger chunk of audio until you find an edit point further in the short. If you still can’t find one (perhaps your characters are speaking over each other for an extended time, without any pauses), try to keep your audio excerpts under 8 seconds and make the best audio cut that you can.



Once you’ve exported all of your dialogue into small manageable WAVs, listen to them together in a playlist so that you can review your work. If you’re happy with the way it all sounds, quit out of Audacity.

# A Quick Note on Model Sheets

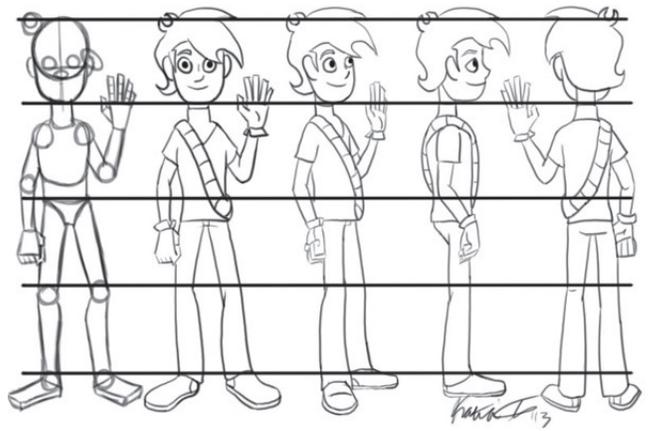
You're just about ready to start working in Flash. That said, if you have the time and / or inclination, you might want to take a moment to work on a model sheet. A model sheet is a reference guide for your character designs. You'd use these sheets to establish the look of your characters at all angles, along with important close-ups. You could also draw several facial expressions for your models so that you can refer to them later. Some model sheets include a sizing chart, so that you can determine the height / weight of your main cast members in relationship to each other. Most professional productions rely on model sheets (or "character bibles"), though some animation for the web will sacrifice them due to time / budgetary reasons.

Main Character

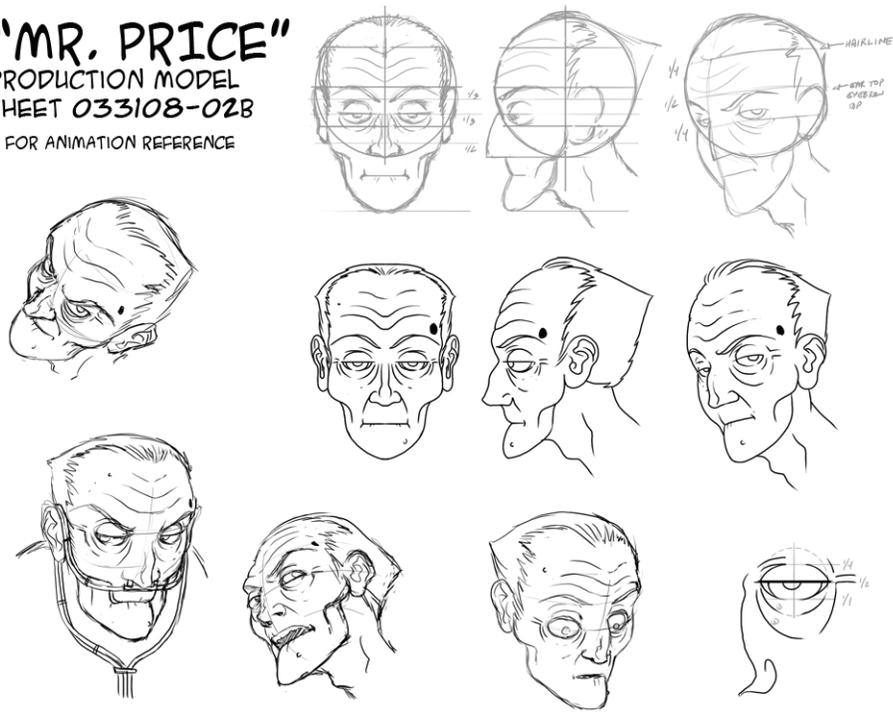
4306- KIT BASIC CONSTRUCTION & DETAIL



Ricky Model Sheet: Turn Around

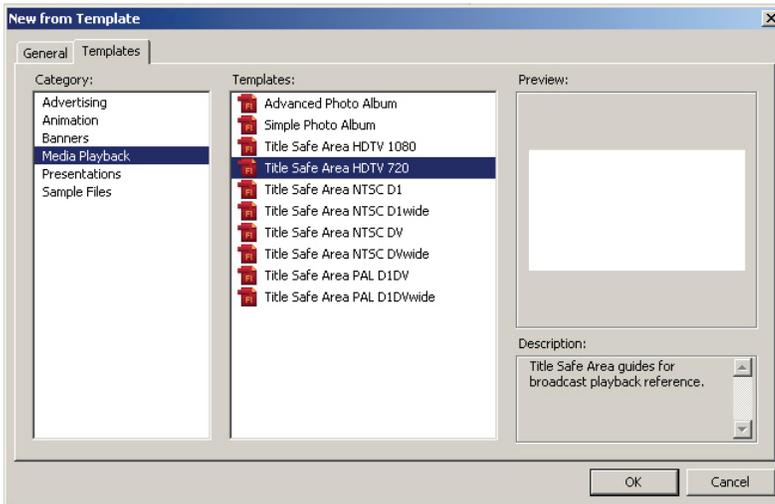


**"MR. PRICE"**  
 PRODUCTION MODEL SHEET 033108-02B  
 - FOR ANIMATION REFERENCE



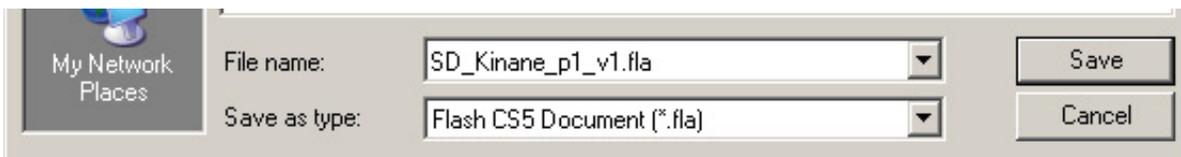
# Starting Up Flash

Now that all of your audio is broken up, you have all that you need to start building your short in Flash. Open up Flash and create a new file using the Media Playback template called “Title Safe Area HDTV 720.”

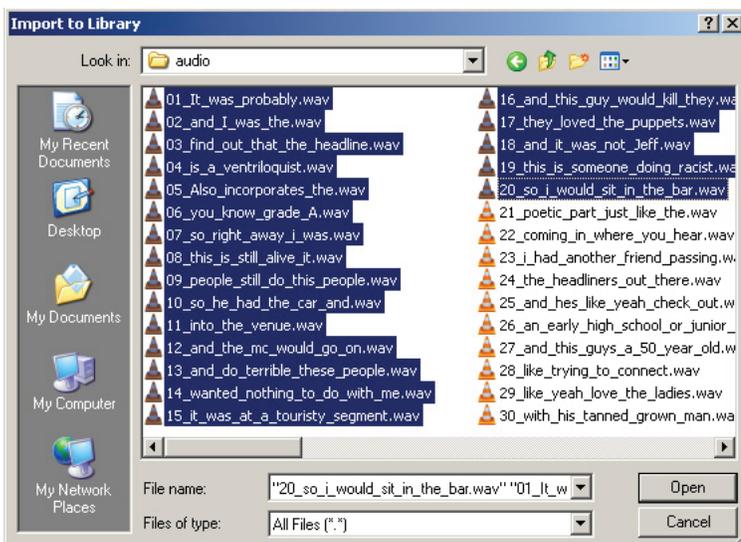


**NOTE:** “Title Safe HDTV 720” sets the frame rate to 29.97 fps (frames per second) with NTSC interlacing, a format that can be easily exported into both broadcast-quality video in North America and YouTube / Vimeo HD. The aspect ratio is widescreen. Flash offers several kinds of formats, but this is the most widely-used. If you are planning on animating for a Flash or iOS video game, set the frame rate to 60 fps.

Save your new file, and append it with a “part number” and a “version number.” (Example: “My\_Short\_pt1\_v1.FLA”) Why the odd naming convention? The reason has to do with Flash’s instability. While Flash is a powerful tool, it’s also incredibly buggy and crashes frequently. This naming system will keep your file sizes nimble and could save you from losing a day’s or a week’s worth of work.

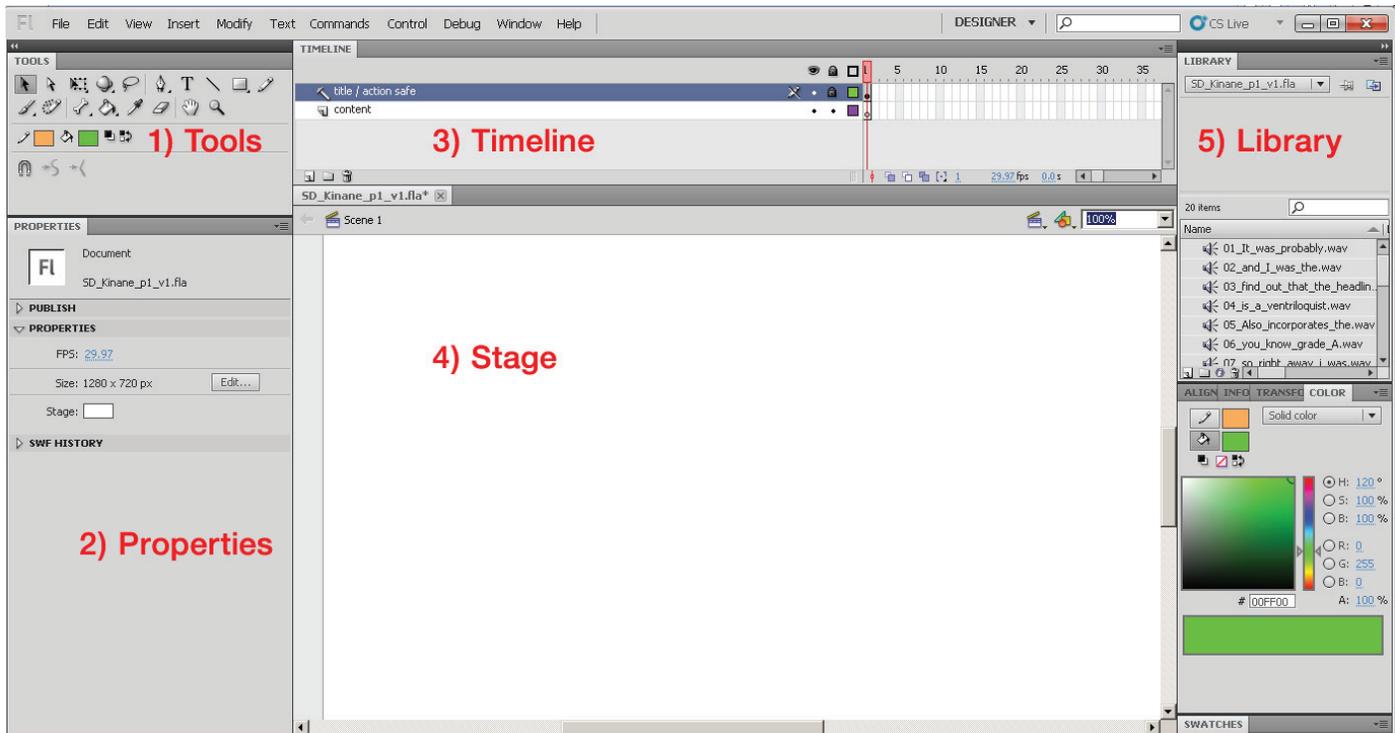


With your new Flash file open, go to “File” >> “Import” >> “Import to Library.” Open the folder that contains your audio file segments, select the first 20 audio files, and import them into Flash. Once they are all imported, hit “Save.”



# A Quick Introduction To The Flash Workspace

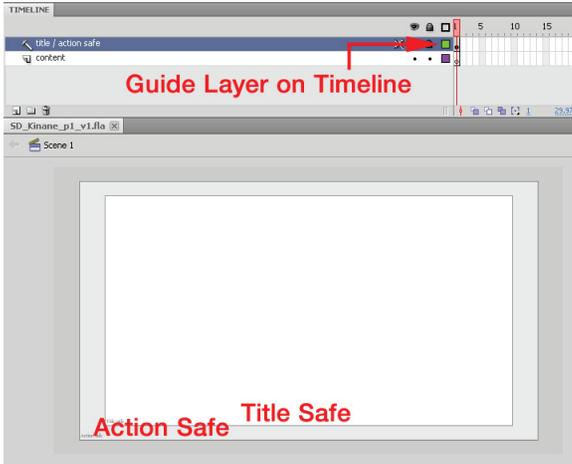
There are five main windows in Flash – Tools, Properties, Timeline, Stage, and Library. Here's what they do...



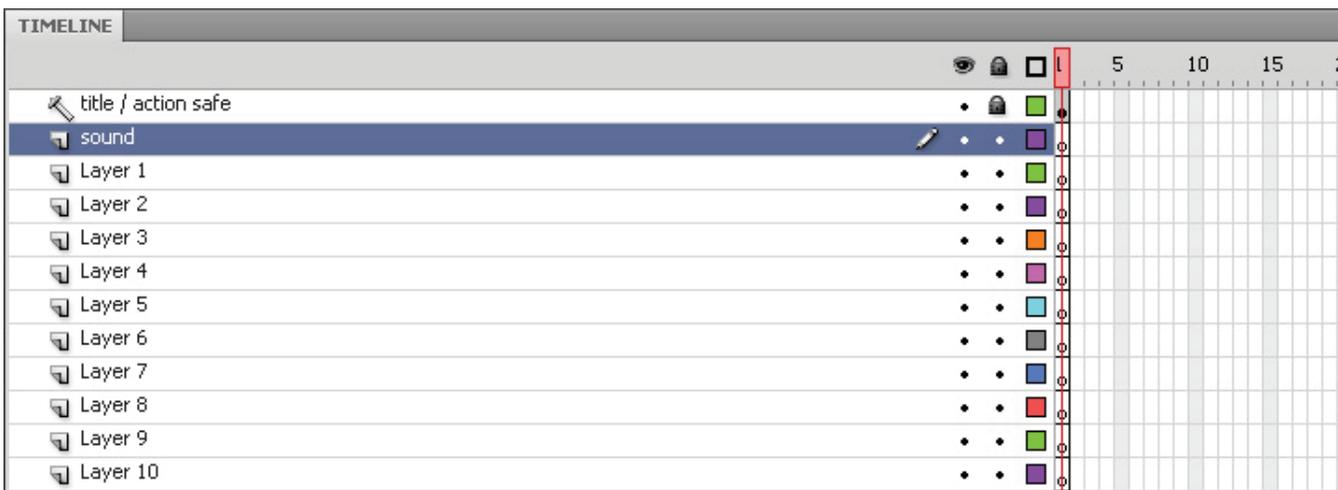
1. Tools – This is your palette of brushes, erasers, colors, and gradients, much like in Photoshop.
2. Properties – From here you can modify the qualities of the graphic objects onscreen. You can also use it to label specific frames, and to control the sound. We will primarily be using it for those two purposes.
3. Timeline – This determines where the objects on the stage are (in layers), and how they move over time. The layers at the top of the timeline are the ones at the front of the stage.
4. Stage – Much like a theatre stage, this is where the magic happens. This is both your work-space, and what your audience will see at the current frame.
5. Library – This is the container for all of your assets. Graphics, symbols, sounds, graphic clips, and photos are contained here.

# Placing Your Audio Into Flash

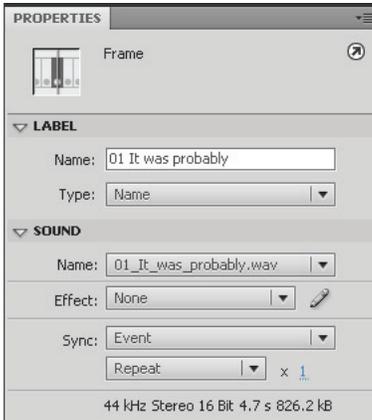
Open your timeline window. You should see one locked layer titled, “title / action safe,” and one unlocked layer titled, “content.” The locked layer is a guide layer, meant to be used by you, the animator, to know where you can use text or motion without having your images become warped or skewed. Any text within the title-safe window will display correctly during a broadcast. Any important action will display correctly within the action-safe window. Make sure this title / action safe layer is always the top layer in your timeline. When you finally publish your finished file, this guide layer will not appear.



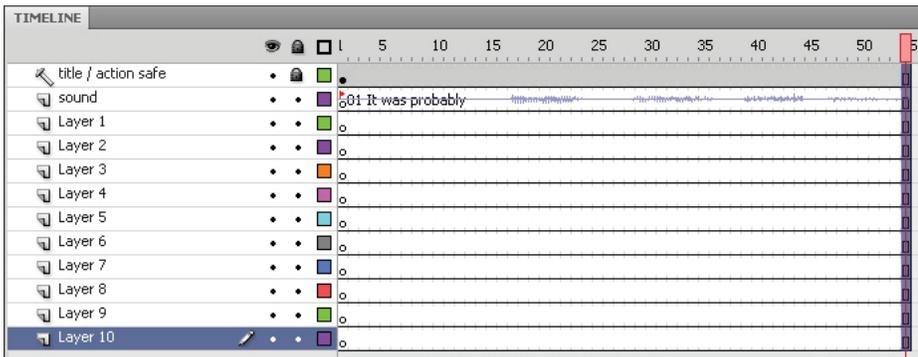
In the timeline window, double-click on the “content” layer’s title on the left, and change the layer’s name to “sound.” Right-click this layer, and select “Insert Layer.” Repeat this until you have 10 empty layers, one empty sound layer, and a guide layer. The sound layer will eventually contain all of the audio files. Those 10 empty layers below the sound layer will hold all of the graphic symbols that we will eventually build. (You can add more than 10 layers if you like, though I find that this amount is enough to hold whatever graphic and animation I plan on using.)



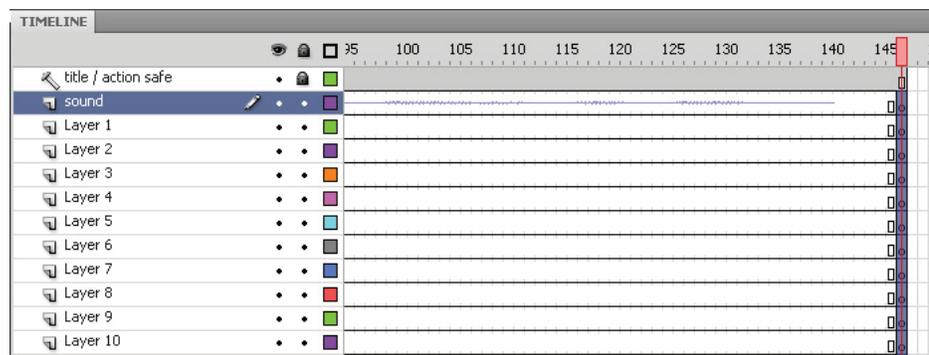
Next, select the empty frame in the sound layer. Click on your Properties window and open the “Sound” tab. Click on the “name” tab and select the first audio file. While you’re still in Properties, open the “Label” tab, and add the audio file’s name to empty Label “name” field.



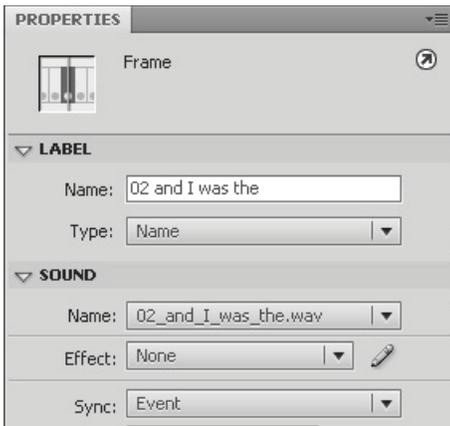
Return to the Timeline section, and start to add frames to all of the layers. Notice that there is a sound wave form within the “sound” layer. Continue to add frames to all of the layers until you reach the end of that sound wave.



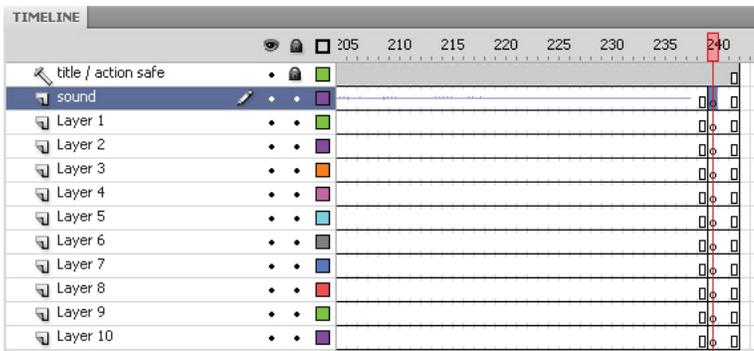
At the very end of the timeline, select one frame from each of the layers except the guide layer, right-click your mouse, and select “Insert Keyframe.” This should create one keyframe on each of the layers.



Select a blank frame in the sound layer after the new key frame. Go back to your properties window, and assign the second sound. Also, add a label with the second sound's title.



As you might guess, we are going to start repeating the process that we used for the first sound file. You're going to go back to the timeline and add frames so that the sound extends through the end of the file, and then you'll add a keyframe.



Repeat this process for the remaining sound files in your library, until you have 20 audio segments laid out on your timeline, with blank frames beneath them. Hit "Save" and close the file. Create a new file with the same "Title Safe Area HDTV 720" template. Use the same naming convention as the first Flash file, except now with a "part two" in the title. (Example: "My\_Short\_pt2\_v1.FLA")



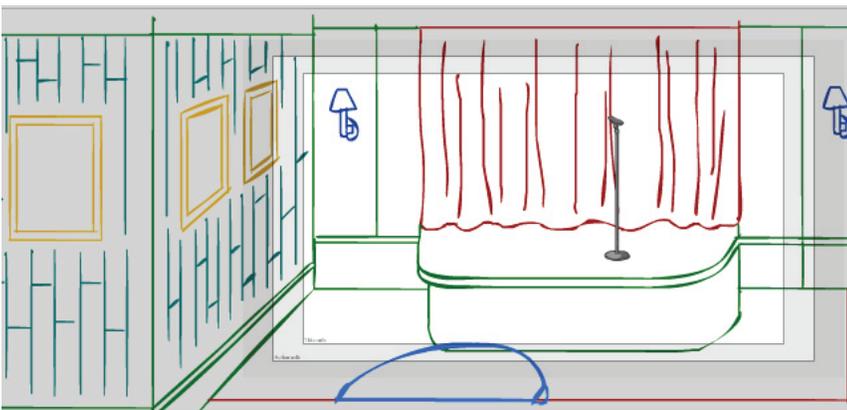
Repeat the process of importing and laying out the audio files on the timeline, only this time use the 21st through 40th audio file. Hit save and close once you have all of the audio in the timelines. If there are more than 40 dialogue audio files in your short, continue with Part Three and Part Four (and so on) until all of your audio has been imported into Flash.

# Creating Backgrounds

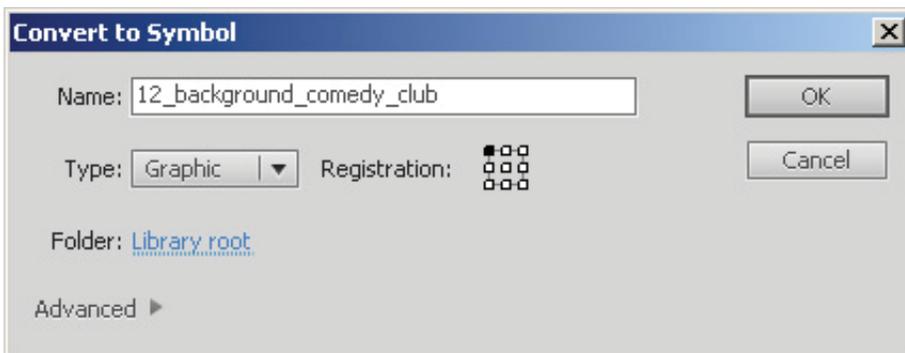
Open up the first Flash file, with your storyboards in hand. The first thing we're going to do is create our backgrounds.

Take a moment to review your storyboards and count the number of backgrounds. Can any of them be re-used throughout your short? Do you need different camera perspectives of these backgrounds? A little planning at the top will save you from extra work that might be unnecessary.

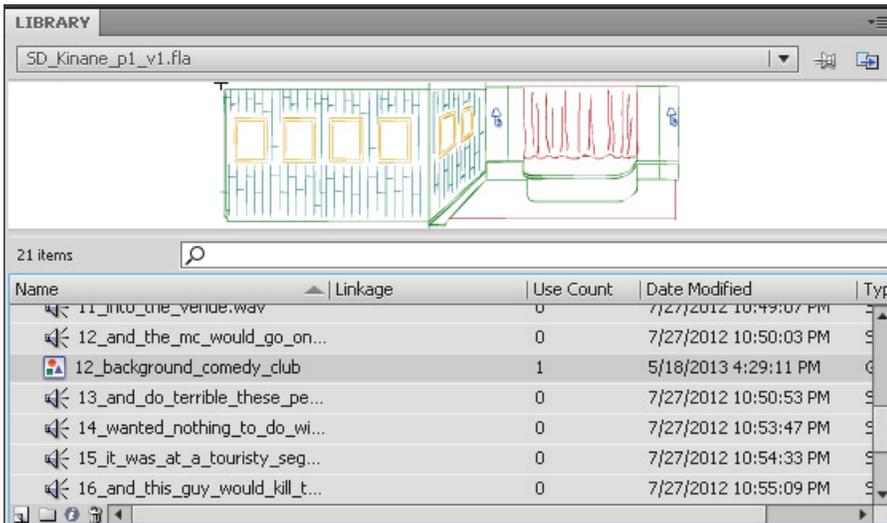
Let's start by drawing a basic skeleton of our backgrounds on the bottom-most layer. Select a single frame on the bottom-most layer, and draw directly onto the stage. (You'll find all of the drawing tools in the tool window.) I find it easier to come up with a simple outline that establishes the perspective, and includes a quick sketch of any important props or details.



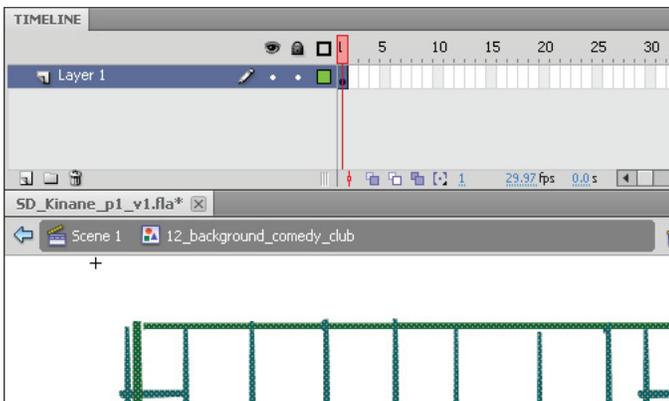
Once you have that sketch drawn, use the selection tool to select all of your drawing. Go to “Modify” >> “Convert to Symbol.” Under Type, select “graphic,” and name your background graphic. I prefer to name the symbols according to where they first appear on the timeline. For example, if a background image of a comedy club first appears during the 12th audio clip, I'll call the symbol, “12\_background\_comedy\_club”. Knowing when specific graphics will appear will be helpful later. Once you've named the file, click “OK.”



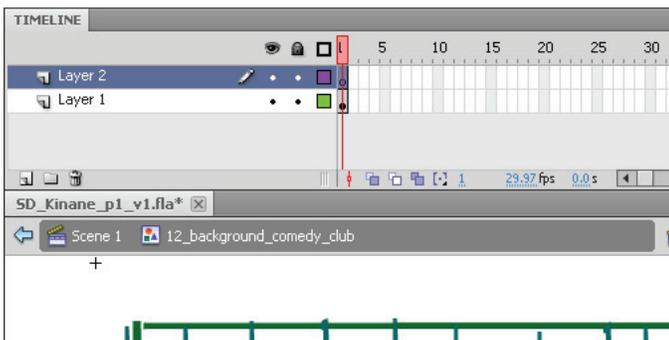
You've just created a symbol that exists both on your stage and in your library. If you need to use that symbol again later on, simply open up your library, select the symbol, and drop it onto your timeline.



We can also edit this symbol. Simply double-click your new background symbol on the stage. This should open up the symbol's timeline. Within this new timeline, you can add still graphics or animation (all on their own layers), just like you would on the main stage timeline. Right now, we've got a simple sketch on one layer. Let's build on that.



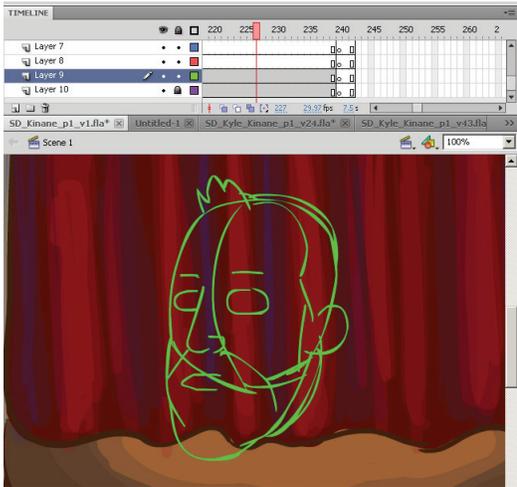
Right-click the title, "Layer 1" and select "Insert Layer." Lock Layer 1, and flesh out your drawing on Layer 2. Once you have the background image together, delete your sketch on the bottom layer. Then, click on the "Scene 1" link on the upper left-hand corner of the stage. This will cause you to exit out of the symbol's timeline, and you'll return to the main timeline.



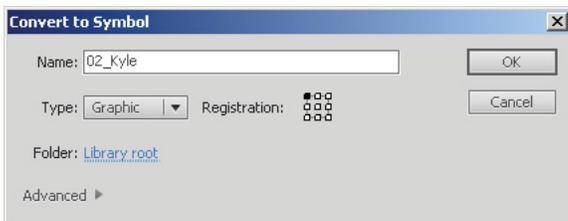
# Building Character Symbols

Once we have some of our background images together, we can begin building the character art. We'll start the process in the same way that we built our background images.

First lock the layer that contains your background image. Next, select a blank layer on your main stage timeline, and draw a basic sketch of your character. Once you have a sketch that you like, select the drawing with your selection tool.



Go to “Modify” >> “Convert to Symbol.” Make sure the type is “graphic” and name your character according to when it first appears on-screen. Hit “OK.”



Double-click the new symbol to open it up. Insert new blank layers on top of the existing sketch. Let's take a moment to think about the character we're building, and how it will move. Which parts of the character will be static? Which parts will have frequent or complex motion? (Examples of this: eyes, mouth, arms, eyebrows) In order to manage our character symbols in a smart way, we'll want to break down these elements, and distribute them onto their own layers. Let's build a simple face as an example of how we'll distribute separate elements onto different layers. First, we'll draw the head, ears and nose on the bottom layer, since those will be static elements.



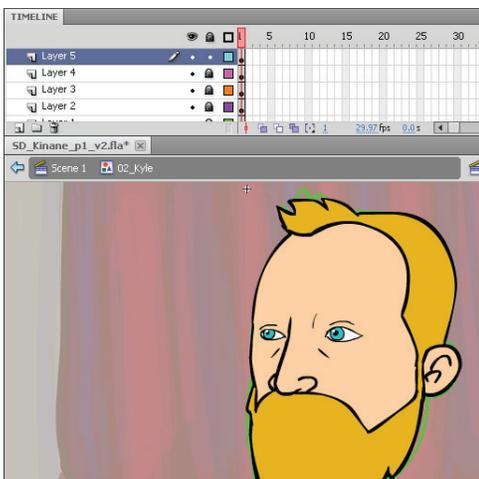
Next, we'll draw white circles on a higher layer, to use as a base for eyes.



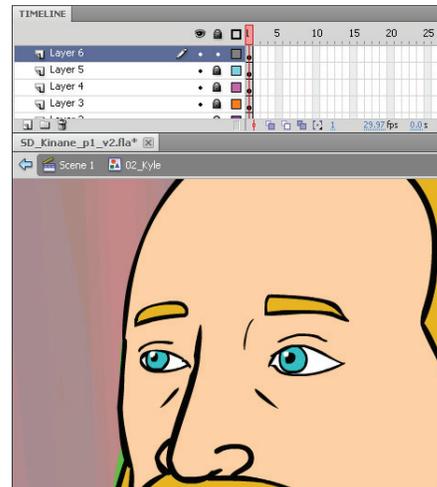
On the layer above that, we'll draw the retinas and irises of the eyes.



After that, we add the eyelids over the eyes.



On the layer above that, we'll add eyebrows.



Finally, we'll add a mouth to the character.



As you can imagine, building the rest of the character is simply a matter of extrapolating on what we've learned. The neck, torso, arms, hands, legs, and any prop the character might be interacting with can be added onto layers within the character symbol. If you'd like, you can even create symbols within symbols, which is especially helpful with props.

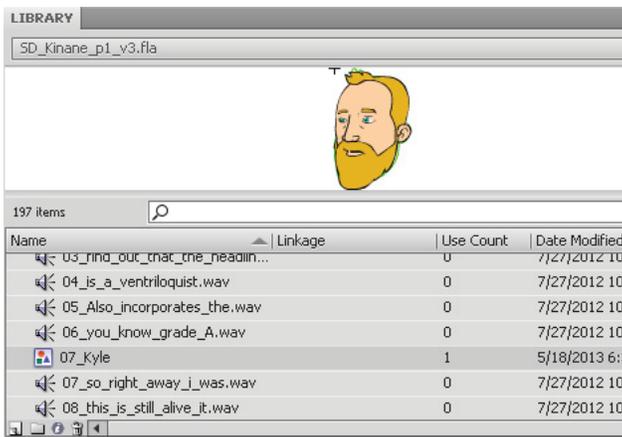
# Duplicating Symbols

Okay, let's say you've finished building the character art and background art for the first scene in your short. Should we start animating it now? WAIT! Not so fast. Will any of the elements in this scene be re-used later? If so, we need to make duplicates of these symbols before we start animating.

Below, I've got my character symbol for Kyle Kinane, as he appears during the 2nd line of dialogue. (I'm calling that symbol, "02\_Kyle.") According to my storyboards, Kyle will appear in the same pose during the 7th line of dialogue. I'm going to open up my library window, right-click the "07\_Kyle" symbol, and select, "Duplicate."



Then, I'll name the new symbol, "07\_Kyle" and hit "OK." From there, I'll scroll to the moment in the timeline where the 7th line of dialogue appears. I'll go back to my library, and drag "07\_Kyle" onto a blank frame within that section of the timeline.



We're doing this for a very specific reason. If we duplicate the symbols before we add animation, those symbols contain just the graphic elements (and are essentially blank slates). If we were to duplicate them after we added animation, then the animation within that symbol would be duplicated too. (And in my short, while the look of "02\_Kyle" and "07\_Kyle" is the same, the way that they move should be totally different.) Again, you can see the importance of storyboards and planning before-hand, as a way of saving us from unnecessary work.

# Animation Introduction

Ok, let's finally get into it. We've got our character symbols laid out on in our first few scenes, along with the backgrounds. It's time to actually make these elements move. There are a few different ways that we can use to make this possible. The two main 2D animation processes are hand-drawn and tween-based. There are benefits and drawbacks to both of these methods, which is why so much 2-D animation is a combination of the two. Let's talk about each of them.

## Hand-drawn Animation

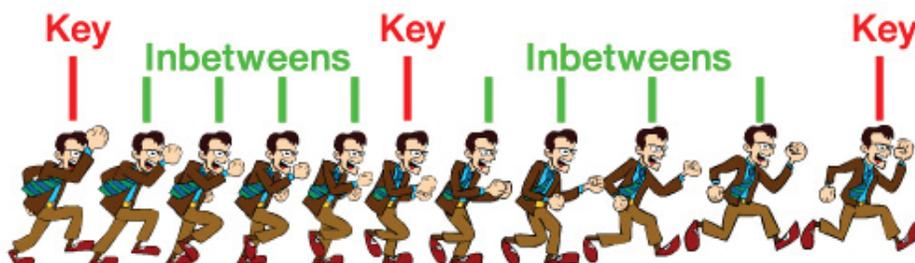
Hand-drawn animation is the most traditional way to animate, and the one that most people are familiar with. It also looks better than tween-based animation, though it's also much more labor-intensive.

There are two methods to animate by hand: Straight Ahead Action and Pose-to-Pose.

**Straight ahead action** means to simply start with one drawing and animate chronologically, from beginning to end. The advantages of this method are that your characters will look more fluid and expressive in their movements. The downsides (of which there are several) are that it's difficult to keep your characters looking consistent, your compositions within your stage will be difficult to predict, and if you make a mistake, you'll probably be redoing a bit of work. Personally, I think straight ahead action should be used primarily for action sequences (like fights, chases or wacky pratfalls) or experimental films.



**Pose-to-pose** involves drawing elements into different keyframes, spaced over anywhere between 5 to 30 frames away from each other. These keyframes are often drawn at the extreme moments of each action. After the keyframes are drawn, the animator (or animation assistant) will go in, and fill in the frames between each keyframe with "in-between" drawings. The advantages of the pose-to-pose method are that you can plan your movements, composition, and pacing with much more control than you would with a straight-ahead-action method. The disadvantages are that your movements can look a little wooden in scenes with dynamic movement. That said, pose-to-pose is the prevalent process in 2D and 3D animation.



Below is an example of pose-to-pose animation. There are several keyframes of a man throwing a ball. We start with the windup, with his arm cocked and ready to throw the ball. Next, we see him start to position the ball near his head, as his body turns. Then we see him about to release the ball, and finally following through with his arm, after he lets go.



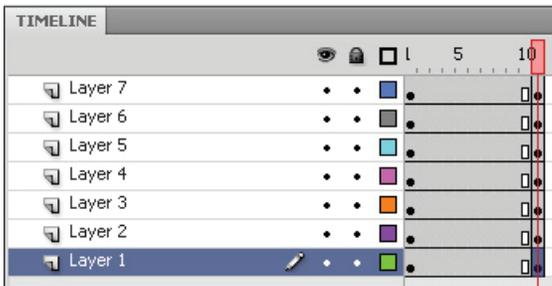
This all looks great, but we can't just leave it there. If we were to just let this run, it would be super choppy and unprofessional-looking. Our next step (which is where the real labor comes in) is in-betweening. As I mentioned earlier, inbetweening means that we draw all of the action between each keyframe. Consistency is important here. You want to make sure your objects look the same from frame to frame. Here's what our keyframes look like with inbetweens...



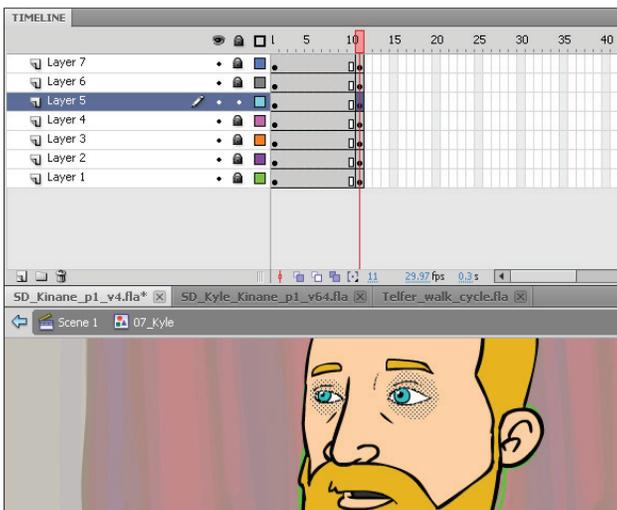
If you're feeling at all intimidated about drawing inbetweens, don't be. Honestly, it takes a bit of practice to get the hang of it. If your motion looks a little off, you can always tweak or redraw a frame here or there to correct it.

# Pose-to-Pose Animation Within Flash

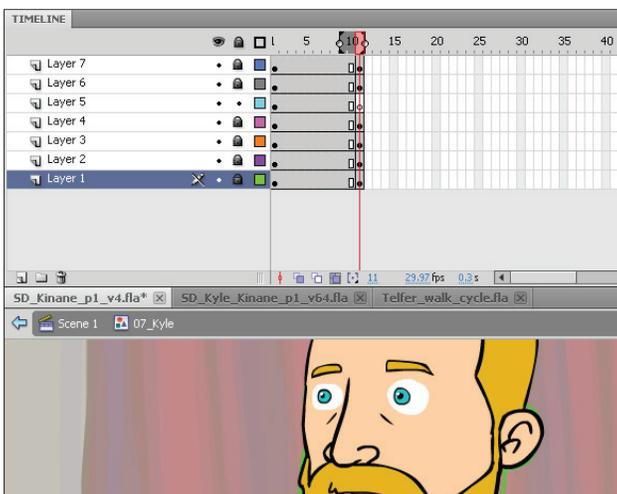
Let's quickly talk about the best way to do this within Flash. Let's open up the symbol of the face that we made. Select all of the layers, up to and including the 11th frame. Right-click the selection, and hit "Insert Keyframe."



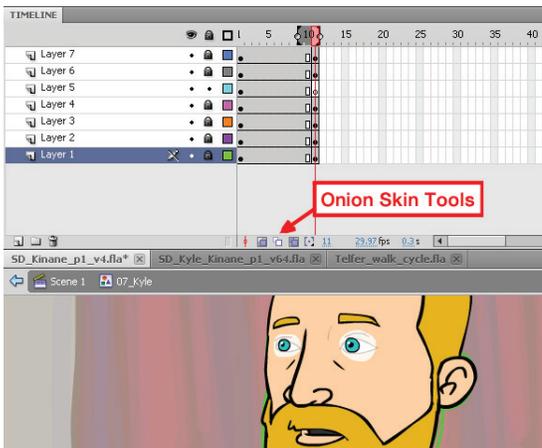
Now, on the 11th frame, find the layer that contains the eyelids by clicking on the graphic. Lock all of the other layers by clicking on the little lock icon next to their titles. Your eyelid layer should be the only one that is editable.



On the 11th frame, erase the eyelids.



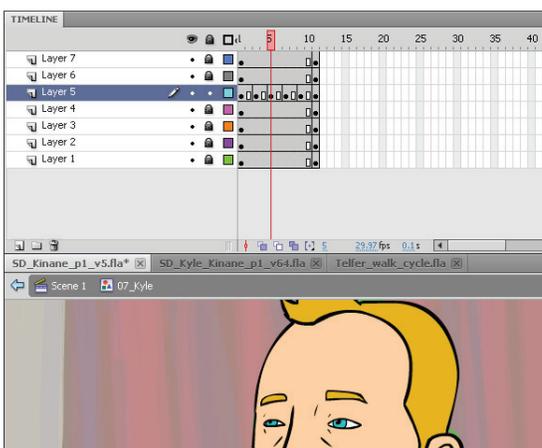
At the bottom of the timeline, there are a series of tools, one of which is the Onion Skin tool. (The two buttons to the right of it control the appearance of the Onion Skin.) Click on it, and you should be able to see a semi-transparent version of the eyelids that are in the previous frame.



On that blank 11th frame, fill in the areas around the eyes with a skin tone, so that the eyes are totally concealed. Then, draw two black lines to make two shut eyelids.



Once those are drawn, click over to the 9th frame in the same layer. Insert a blank keyframe. Using the semi-transparent image of the shut eyelids, draw the eyes slightly more opened. Go to the 7th frame and repeat the process. The same goes for the 5th frame and 3rd frame.



Now select the first frame, and hit the “Return” key. Your animated eyes should play through on the stage. From this example, you can get understand the process of creating the inbetweens in any context. Granted, this is a very simple animation, but the general principles apply any situation, no matter how complex.



## Frame Rate

You might’ve noticed that our inbetweens stretched over two frames in this example. There’s a reason behind this. Most broadcast and digital formats play at roughly 30 frames per second (29.97 fps, to be exact). That said, animated movement will look natural to the human eye when drawn at a minimum of 12 frames per second. If we only draw 15 drawings per second (as opposed to 30 drawings), and allow each drawing to stretch over two frames, most viewers won’t be able to tell the difference, and we’ve saved ourselves a ton of work. (Consequently, if we are animating for a Flash game, which runs at 60 frames per second, we can still draw 15 drawings per second, and stretch each of these drawings over 4 frames.) Here’s a handy guide...

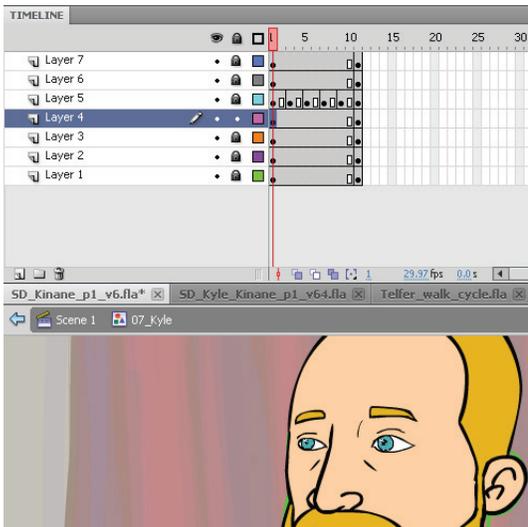
Format	Number of Drawings Per Second	Drawing per Frame	Frame Rate
Broadcast / Digital	15	2	30 (roughly)
Video Game	15	4	60

## Tween-Based Animation

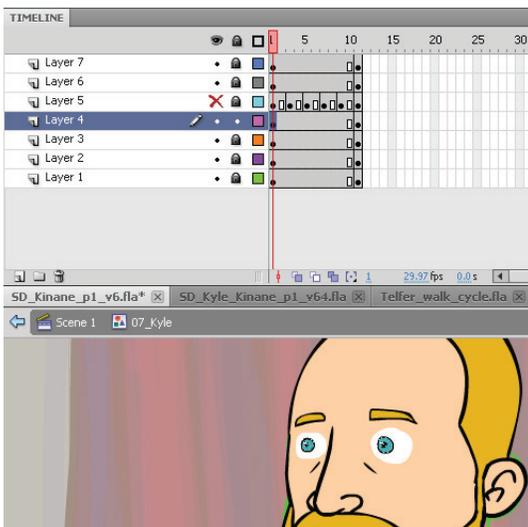
We’ve gone through the basics of hand-drawn animation, and as you can probably tell, inbetweening is some laborious, time-consuming work. We can cut down on some of that labor by letting Flash handle the inbetweening. Flash comes with a set of tools called “twens” (which is just short-hand for in-betweening) that handle a few different parameters. There are motion tweens, shape tweens, and classic tweens. In each of these tweens, you will set a starting keyframe, an ending keyframe, and perhaps a few middle keyframes. Flash will build the inbetweens. If we build our characters in a way that is conducive to tweening, we can re-use graphics and motion throughout our short, saving us a ton of time as well.

As I mentioned, there are motion tweens and shape tweens, both of which are pretty self-explanatory. While those tweens are useful, I want to focus on classic tweens. I prefer to use classic tweens because they afford you more flexibility. You can change the opacity, color, shape, size, movement, and position in a classic tween, whereas motion and shape tweens are more restrictive.

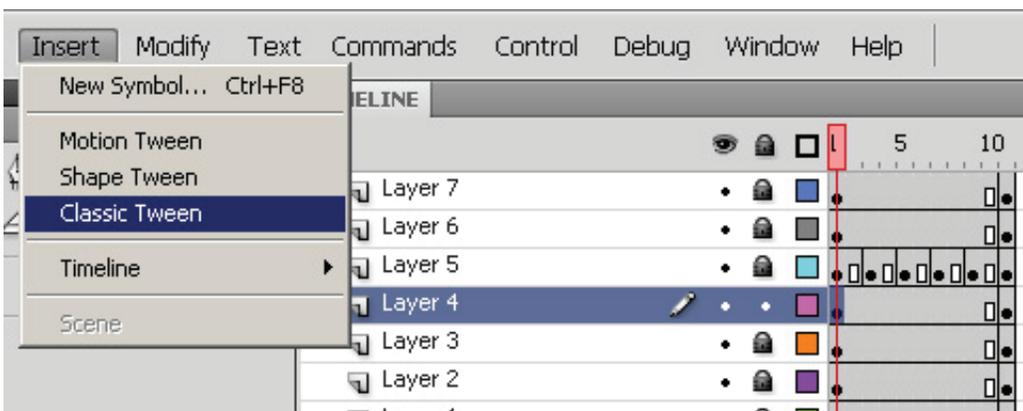
Let's look at an example of how to use a classic tween. First, let's open up our original "face" example. On the timeline, find the layer that contains the retinas and irises of the eyes. Unlock this layer, and lock all of the other layers.



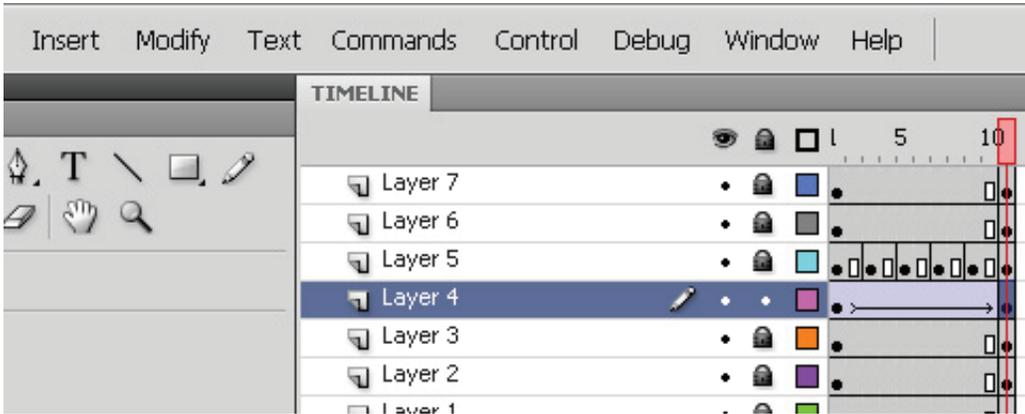
Hide the eyelids layer, using the "show/hide layer" tool, near the layer titles.



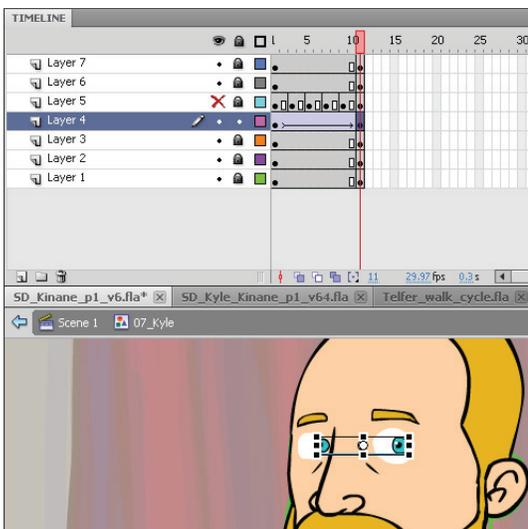
Select the first frame of the iris layer, and go to "Insert" >> "Classic Tween"



The frames within the layer should turn from gray to purple on the timeline, signifying a tween. While still on the first frame in the timeline, drag the iris symbol to the left corner of the eye. Next, on the timeline, select the 11th frame in the iris layer. Make sure that there is a keyframe there. If not, right-click it, and select “Insert Keyframe.”

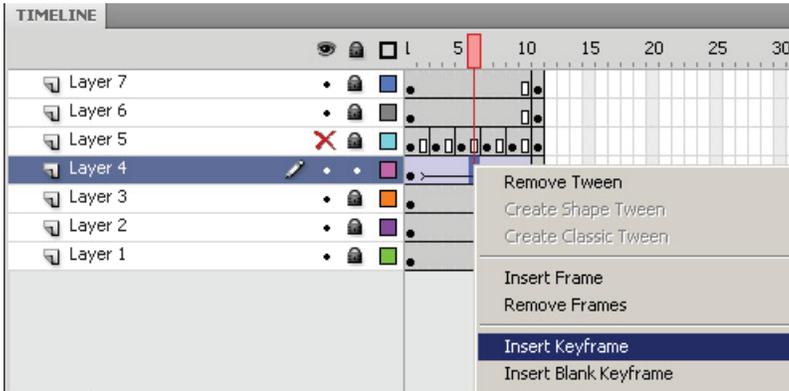


Go to the stage and drag the iris symbol to the right corner of the eye.

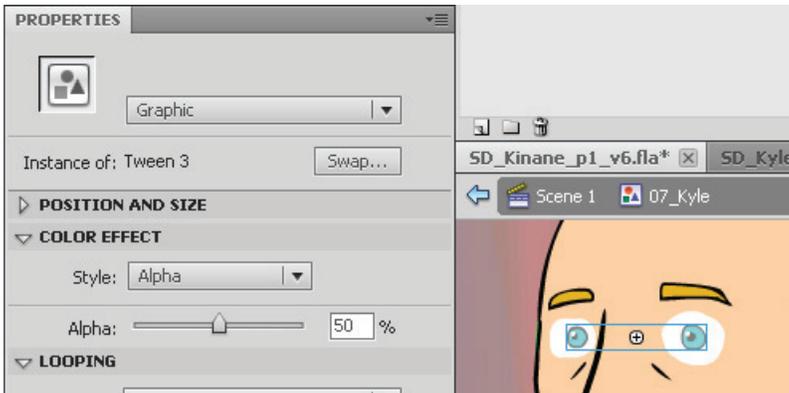


Go back the first frame in the timeline, and hit “enter.” The iris on the stage should move from left to right.

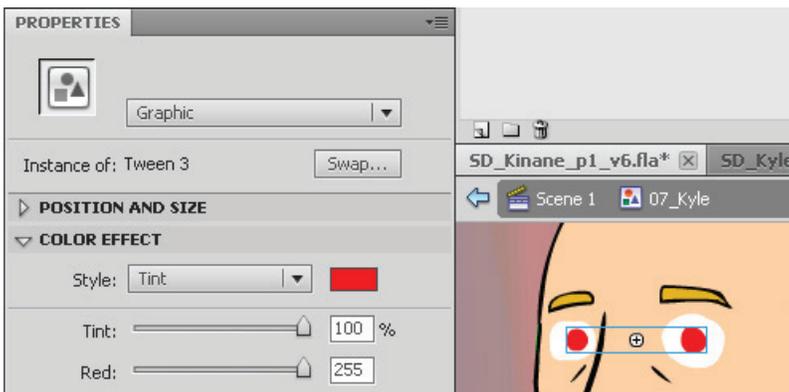
Let's play with the color and opacity properties. Go to the 6th frame, right-click the frame, and select "Insert Keyframe."



Click on the iris on the stage, and then open up the Properties window. Under "Color Effect" change the style from "none" to "alpha." By reducing the alpha from 100% to something smaller, we are making the iris semi-transparent.



Let's change the color instead. While still in Properties, change the style of the color effect with "Tint." Let's change the color to red. Now return to the 1st frame, and hit "enter."

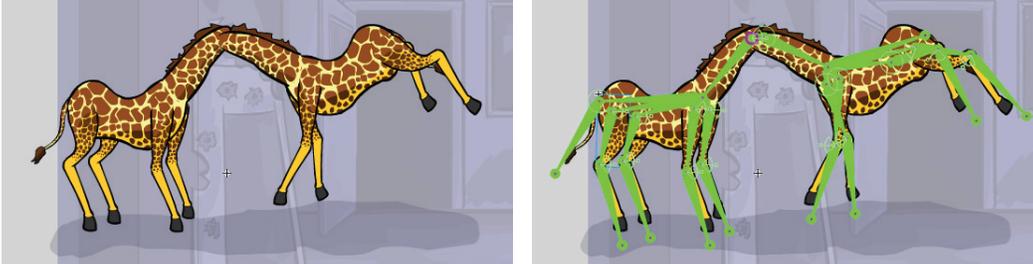


If you are animating on a small team or just for yourself, it's a good idea to use a mixture of tweens and hand-drawn animation. Many of your character symbols can be a combination of the two, sometimes even alternating between the two techniques. For example, you could animate a hand being raised, and since the hand won't change its shape considerably, you would use a tween. Then, perhaps the hand makes a "thumbs up" once it's raised. For that gesture, you could use hand-drawn animation. If you use too many tweens, your short can look a bit stilted or "puppet-like." If you only use hand-drawn animation, you'll be drawing for a considerably longer amount of time than you might need to.

## A few quick topics that are worth investigating

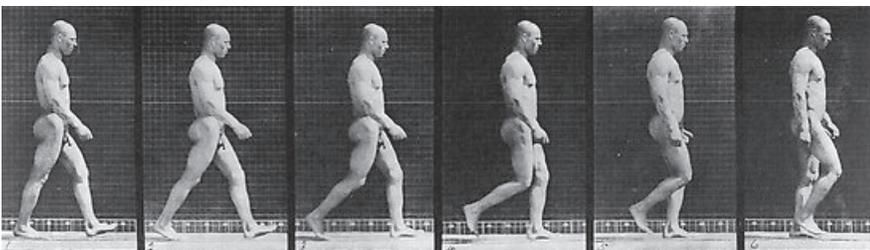
### Puppeting

With the release of Flash CS4, Adobe has added inverse kinematics as a tool for animation. Basically, that means that you can build segmented drawings that work very much like puppets. Inverse kinematics is a fancy word for skeletons (with controlled articulation), and as such, Flash's bone tool lets you build these skeletons. (They are also called "armatures.") While I'm not going to go into the process here (Flash's Help menu has a full demonstration), I will say that they are surprisingly easy to build. That said, personally I only use them for characters with a lot of movable joints, like horses, dogs, spiders, etc. Puppeting tends to look pretty stilted, especially if you use it too much.



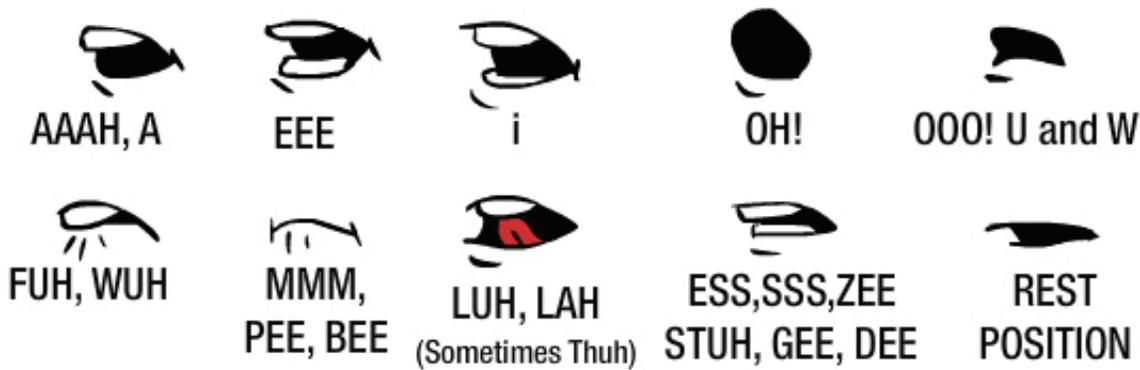
### Walk cycles

It seems like animating a character walking across the screen would be quite easy, but it takes a bit of practice. In order to really get it right, you need to manage all of the limbs and pay attention to how the body's weight is distributed. I think the best way to learn how to draw a walk cycle is to look at either Muybridge's Walking Man photographs or Preston Blair's Walk Cycle series. Keep an eye on how the figure bobs as he / she walks. If you mess up at first, try just tracing one of these references a few times, just to get the hang of it. Once you start feeling confident in your abilities, try to add your own flourishes to your walk cycle, especially depending on the size / weight / personality of the character.

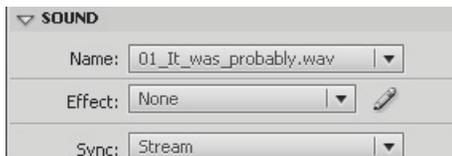


# Lip-Syncing

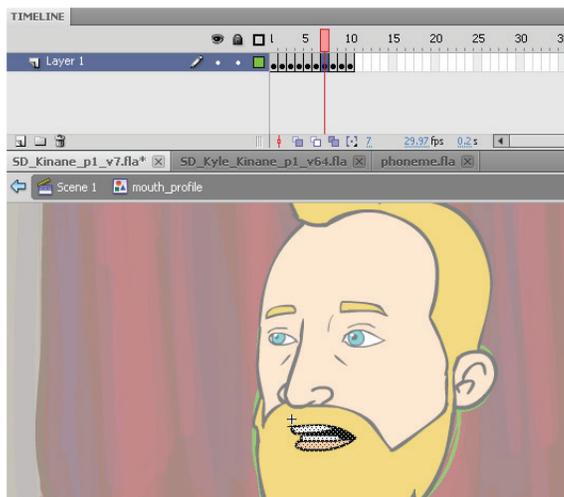
Lip-syncing dialogue isn't particularly difficult work, but it can be very, very tedious. Traditionally, lip-syncing involves listening to the dialogue track syllable by syllable and applying the appropriate mouth shapes (called "phonemes") to each sound. There are only 10 basic phonemes that you need to use to simulate the English language. (Disney uses 12, but you don't need to.) Some third-party companies offer lip-syncing plug-ins that can speed up the process. (SmartMouth is a popular one, and it costs about \$90.) That said, even if you use these plug-ins, it's still a good idea to go back and tweak the mouth movements by hand. Here is a chart of those 10 phonemes.



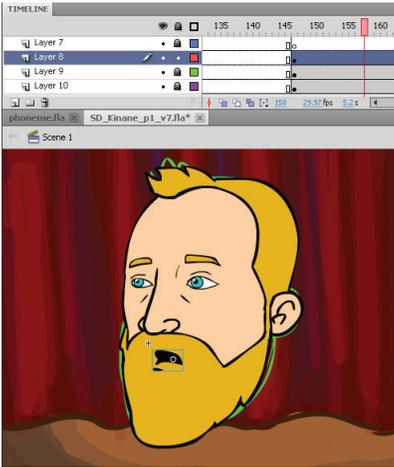
If you are lip-syncing by hand, you'll want to start by selecting the frame that contains the sound file that you are lip-syncing to. Then go into the properties menu, and change the sync from "event" to "stream." This will allow you to listen to the audio as you move back and forth across the timeline.



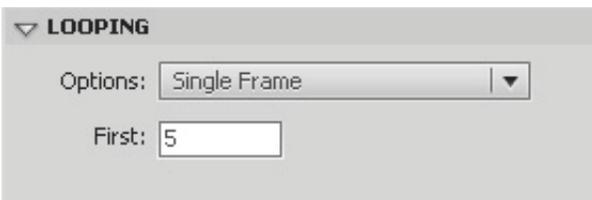
I find that the best way to lip-sync is to build one mouth symbol for a particular character in a scene. Within that mouth symbol, you'll want to put a different phoneme on each single frame, all on the same layer. Once you've got a mouth symbol containing all of the phonemes, exit to the main stage timeline.



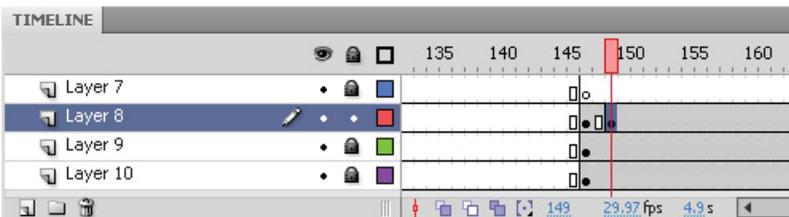
Place this mouth symbol onto the character's face on the stage. Then select the first frame of the mouth symbol in the main timeline.



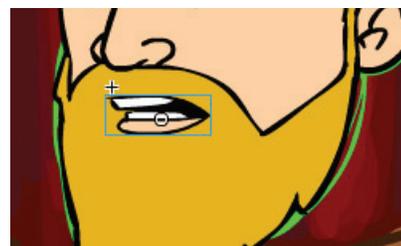
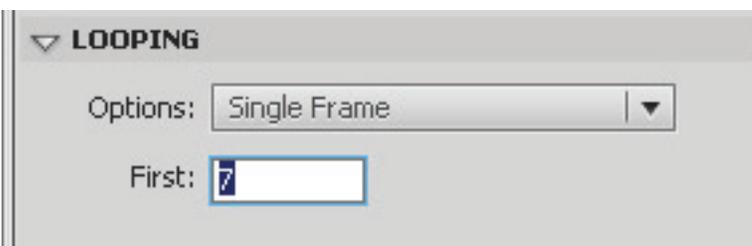
Go into the properties menu, and in “looping”, and change the option to “single frame.” This will cause the mouth symbol to freeze on one frame. Then, change the “first” number field to whatever number the appropriate phoneme is for the dialogue. So, if the dialogue warrants an “uh” sound, and the mouth shape for “uh” is in the 5th frame of the mouth symbol, change the “first” number field to 5.



Every time there is a new syllable in the dialogue, you'll need to insert a new keyframe.



Then you'll change that “first” number field again to the appropriate phoneme. In this case, it's an “s” sound, which is the 7th frame in the mouth symbol. Type in “7,” and the graphic should automatically update.



Also, in order to make your speech look natural, you'll want the phoneme to change one frame before the dialogue that it corresponds to. (So, if your character is making an "fff" sound, it should start curling its mouth a frame or two before the actual sound occurs.) Another good tip to remember - if a character pauses in the middle of a dialogue, don't automatically use the "closed mouth" graphic. Sometimes a closed mouth will look unnatural, since speakers will leave their mouths slightly open during pauses.

## Publishing

As you are building your animation, you can preview your film by hitting CTRL + Enter, or by going to "Control" >> "Test Movie." The SWF file that is in the same folder as your FLA file is your exported, playable movie. Once your movie is actually complete (or near-complete), go to "File" >> "Publish Settings" and make sure that your publish settings are set to default. If they are, you can hit "Publish" in that menu, or you can simply go to "File" >> "Publish." Again, the exported SWF is what's important.

Flash does include the option to publish straight to Quicktime movies or AVIs. Don't use it. It's seriously buggy, and it will screw up the timing of your short. You need to use After Effects. We'll go into that in a moment.

## A Note About Flash's Bugs / Eccentricities

Flash has a few downsides, the biggest being its tendency to crash. Remember how I recommended that you title your Flash files like so: FileName\_p1\_v1.fl? The reason that we use that naming convention is two-fold.

- 1) Once Flash files start to get large, they are more susceptible to crashes. Breaking them up into separate parts will keep them small.
- 2) Save your short often, and "save as" into a new version every hour or so. (Hence the "v1" in FileName\_p1\_v1.fl.) I've had Flash crash in the middle of a save. If that happens, your file will become corrupted and useless. "Saving as" will spare you from this issue.

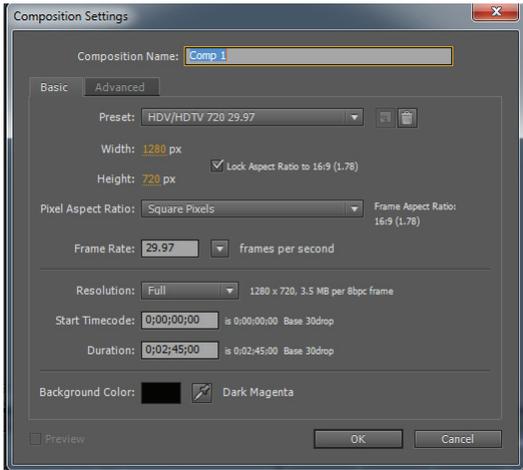
## Post-Production and Compositing

Once you have your animation completed and exported into SWFs, you'll want to do a little post-production work in After Effects. After Effects will give you a clean, high-quality Quicktime movie that you can then convert into any video format you need. You'll also be using After Effects if you have a sound designer available to do foley work or final mixing.

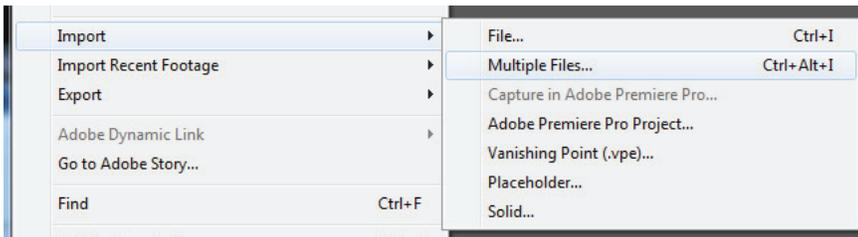
A quick side note: if you simply want to play your movie in a browser, you won't need After Effects. That said, if you'd like to upload your movie to YouTube or Vimeo, or make a DVD ready version of your film, you'll need to use After Effects.

# After Effects and Media Encoder

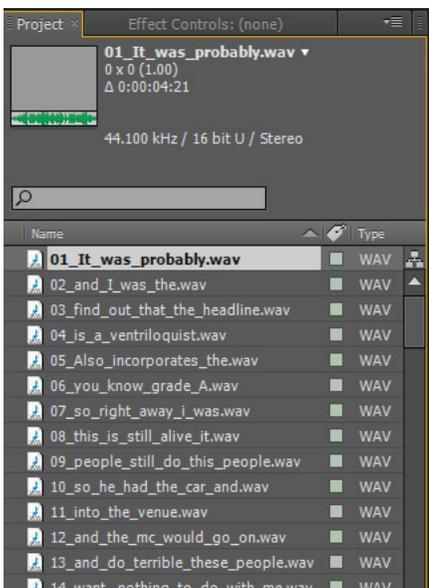
Open up After Effects, and go to “File” >> “New Project.” Then go to “Composition” >> “New Composition.” Use the preset called, “HDV/HDTV 720 29.97.” Hit “OK.”



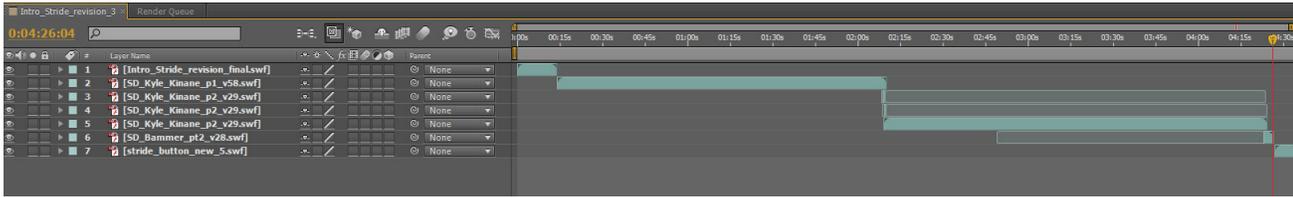
After Effects is super powerful program, but one of it's down-sides is that it does not recognize sound contained in an SWF. You'll need to import the sound files, and lay them over your existing SWFs. Go to “File” >> “Import” >> “Multiple Files.” Select each of your SWF files and your audio files, and hit “Open.” Once you're finished importing those files, hit “Done.”



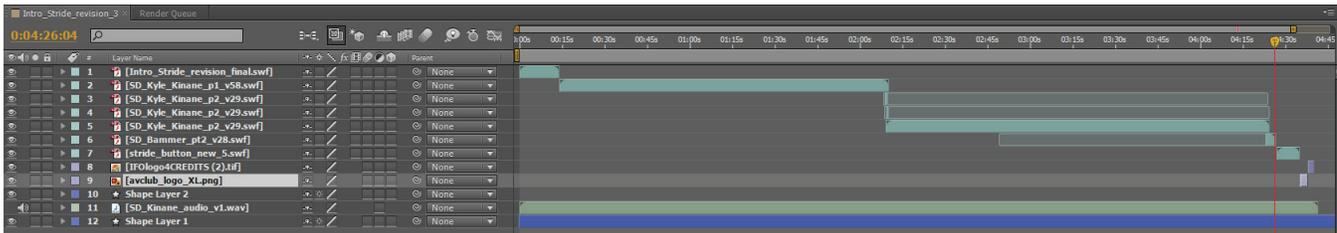
After Effects is similar to Flash in that it has also has a library, a stage, and a timeline. In After Effects however, those are called the project, the composition, and the timeline, respectively. Now that you've imported your SWFs and your audio files, they should appear in the project window. Hit “save.”



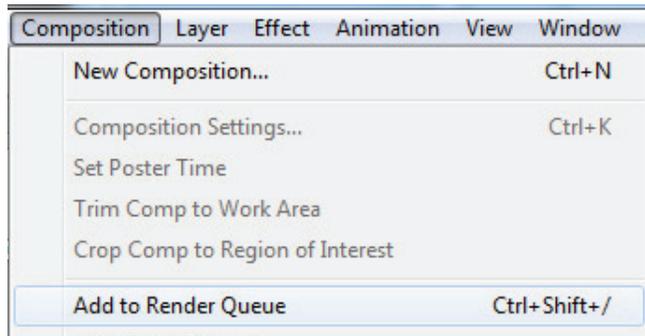
Now drag the SWF files onto the timeline in the order that you'd like them to appear. They should show up in the composition window once they are on the timeline.



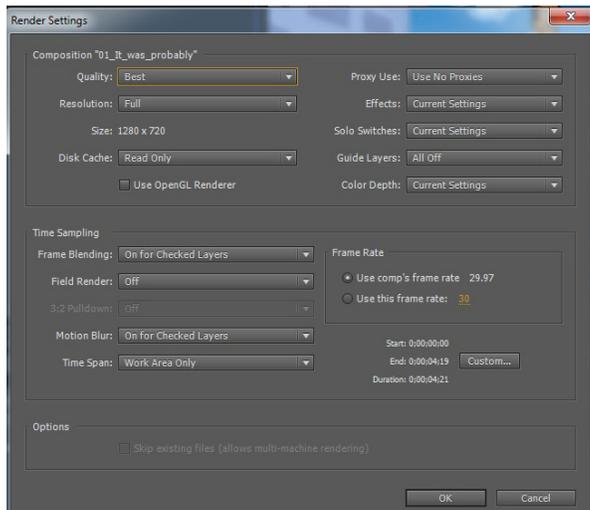
Next drag the sound files onto the timeline in the order that they appear. You may have to have to spend a little time aligning the audio files correctly, just to make sure that everything syncs correctly.



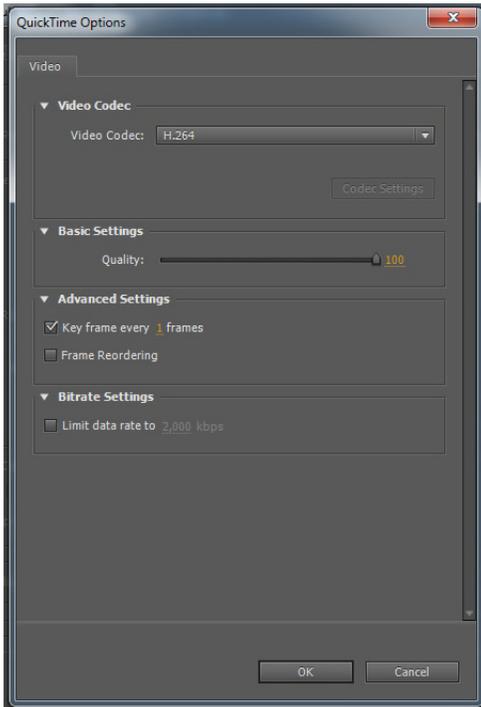
Once you have both the SWFs and the audio files laid out in the timeline, check the final run-time of your short, and make a note of it. Then, go to “Composition” >> “Add to Render Queue.” The Render Queue should come up in a tab over the timeline.



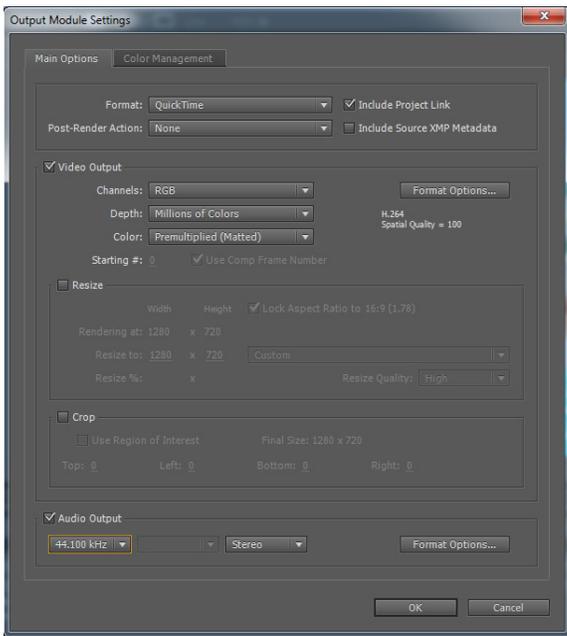
Click on “Render Settings.” Keep everything on its default “best” settings but change the duration (start and end) in the lower right-hand corner to the total run-time of your movie. Click “OK.”



Click on “Output Module.” Change the format to “Quicktime.” Click on “format options,” and change the video codec to “H.264.” Under “Advanced Settings,” check the box that says Key frame every 1 frames. Hit “OK.”

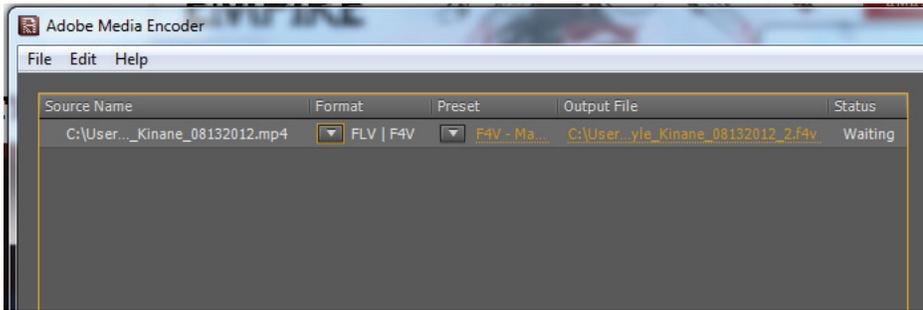


Click on the checkbox next to “Audio Output,” and change the format to “44.100 kHz.” Hit “Ok.” In the Render Queue, click the field next to “Output to,” and name the final outputted movie. Hit Render in the upper right-hand corner.

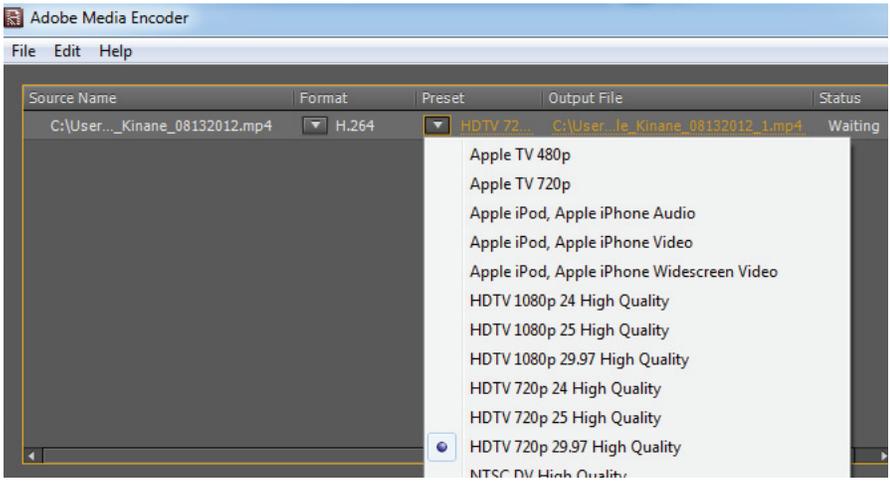


Once the file has finished rendering, open it up, and play it through. Is the audio aligned correctly? Are there any gaps or black screens (due to misplacement of the SWFs)? If not, you should have a high-quality Quicktime Movie of your short.

Quit out of After Effects, and open up Adobe Media Encoder. Drag your new Quicktime Movie onto Media Encoder's Render Queue.



Change the format to "H.264," and then click on the arrow next to the Preset field. Scroll to whatever format you'd like to output your final file to. (Options include: YouTube HD, Vimeo HD, iPod, and the one I use the most: HDTV 720p 29.97 High Quality.) Once you've selected your desired format, click "Start Queue" in the upper right hand corner.



Once the file is rendered, check the finished file to make sure that it plays correctly. If it looks good – awesome! You've finished your film.

Want to add a bit of polish to your movie? If you have a sound designer(s) available, give them a copy of the exported film and your original audio files. They should be able to give you a final, complete audio mix that you can re-import into After Effects. Then, it's simply a matter of replacing the dialogue audio with the final mix from your sound designer. Follow the same process in After Effects and Media Encoder to produce a final movie with professional sound.

## Distribution

Now that you have your short together, how can you get it seen? Well, obviously YouTube and Vimeo are two viable options. That said, it's hard to get eyes on your film without a celebrity name, a following, and / or a lot of luck. (Even with those things, it can still be very difficult.) You could consider submitting to short film fests. The site, [Noentryfeefestivals.com](http://Noentryfeefestivals.com) lists hundreds of film festivals from all over the world, all by their submission deadline dates. Also, in Bill Plympton's "How to Make Toons That Sell," the author spends a whole chapter on the pros and cons of various animation festivals that he's been to. (There are many of them.)

## Clients

Of course, if you're feeling confident in your animation skills, you can also ply your skills as an animator. For this, I would recommend going to Adobe User Group meetings (there are local meetings all over the country), attending animation festivals and meet-ups, and looking online at ads / animation house job listings.

Most clients will want to see some work of yours, which is totally natural. Some might want you to do an animation test or an inbetweening test, that you can more or less do from home.

Things get a little murky once clients start asking for spec work. (This is short for "speculative work." Basically, it means working for free with the assurance that paid work will eventually come out of it.) Without getting into a long conversation about this, you should really try to avoid spec work. Even if you're doing sample work for a specific project, it's pretty easy to get taken advantage of if you're not careful. Be willing to compromise with a client, but make sure that you are taking care of yourself. This is especially true for YouTube channels that might want to hire you as an animator. Double-check what their deadlines are, and what they expect from you. YouTube channels especially want content cheap and fast, and will work you to death if you're not careful.

On a positive note, there are some really great clients and collaborators out there. If you learn these tools, you can really open yourself up to everything from full-time employment at an advertising firm, to creating amazing GIF loops, to making indie video games. (Speaking of which, if you are interested in developing video games, check out Starling and StarlingPunk, two open-source development tools that you can use with your newly-acquired animation skills. They export to iOS and Android!)

Again, if you have any questions, please don't hesitate to reach out to me. Thanks again for spending this time with me, and I hope you enjoyed it as well!

## Further Reading

The Illusion of Life: Disney Animation by Ollie Johnston and Frank Thomas  
How to Make Toons That Sell (Without Selling Out) by Bill Plympton  
Animation – How to Draw Animated Cartoons by Preston Blair  
Understanding Comics by Scott McCloud

# The 12 Basic Principles of Animation

I wanted to at least spend some time talking about technique, and I figure that these principles are probably the best fundamental tools out there. Paraphrased from the “Illusion Of Life” by Frank Thomas & Ollie Johnston. (pp.47-69) This is from their site. Look these up and read the original version for a complete understanding.

## #1 Squash and Stretch

This action gives the illusion of weight and volume to a character as it moves. Also squash and stretch is useful in animating dialogue and doing facial expressions. How extreme the use of squash and stretch is, depends on what is required in animating the scene. Usually it's broader in a short style of picture and subtler in a feature. It is used in all forms of character animation from a bouncing ball to the body weight of a person walking. This is the most important element you will be required to master and will be used often.

## #2 Anticipation

This movement prepares the audience for a major action the character is about to perform, such as, starting to run, jump or change expression. A dancer does not just leap off the floor. A backwards motion occurs before the forward action is executed. The backward motion is the anticipation. A comic effect can be done by not using anticipation after a series of gags that used anticipation. Almost all real action has major or minor anticipation such as a pitcher's wind-up or a golfers' back swing. Feature animation is often less broad than short animation unless a scene requires it to develop a characters personality.

## #3 Staging

A pose or action should clearly communicate to the audience the attitude, mood, reaction or idea of the character as it relates to the story and continuity of the story line. The effective use of long, medium, or close up shots, as well as camera angles also helps in telling the story. There is a limited amount of time in a film, so each sequence, scene and frame of film must relate to the overall story. Do not confuse the audience with too many actions at once. Use one action clearly stated to get the idea across, unless you are animating a scene that is to depict clutter and confusion. Staging directs the audience's attention to the story or idea being told. Care must be taken in background design so it isn't obscuring the animation or competing with it due to excess detail behind the animation. Background and animation should work together as a pictorial unit in a scene.

## #4 Straight Ahead and Pose to Pose Animation

Straight ahead animation starts at the first drawing and works drawing to drawing to the end of a scene. You can lose size, volume, and proportions with this method, but it does have spontaneity and freshness. Fast, wild action scenes are done this way. Pose to Pose is more planned out and charted with key drawings done at intervals throughout the scene. Size, volumes, and proportions are controlled better this way, as is the action. The lead animator will turn charting and keys over to his assistant. An assistant can be better used with this method so that the animator doesn't have to draw every drawing in a scene. An animator can do more scenes this way and concentrate on the planning of the animation. Many scenes use a bit of both methods of animation.

## **#5 Follow Through and Overlapping Animation**

When the main body of the character stops all other parts continue to catch up to the main mass of the character, such as arms, long hair, clothing, coat tails or a dress, floppy ears or a long tail (these follow the path of action). Nothing stops all at once. This is follow through. Overlapping action is when the character changes direction while his clothes or hair continues forward. The character is going in a new direction, to be followed, a number of frames later, by his clothes in the new direction. "DRAG," in animation, for example, would be when Goofy starts to run, but his head, ears, upper body, and clothes do not keep up with his legs. In features, this type of action is done more subtly. Example: When Snow White starts to dance, her dress does not begin to move with her immediately but catches up a few frames later. Long hair and animal tail will also be handled in the same manner. Timing becomes critical to the effectiveness of drag and the overlapping action.

## **#6 Slow-Out and Slow-In**

As action starts, we have more drawings near the starting pose, one or two in the middle, and more drawings near the next pose. Fewer drawings make the action faster and more drawings make the action slower. Slow-ins and slow-outs soften the action, making it more life-like. For a gag action, we may omit some slow-out or slow-ins for shock appeal or the surprise element. This will give more snap to the scene.

## **#7 Arcs**

All actions, with few exceptions (such as the animation of a mechanical device), follow an arc or slightly circular path. This is especially true of the human figure and the action of animals. Arcs give animation a more natural action and better flow. Think of natural movements in the terms of a pendulum swinging. All arm movement, head turns and even eye movements are executed on an arc.

## **#8 Secondary Action**

This action adds to and enriches the main action and adds more dimension to the character animation, supplementing and/or re-enforcing the main action. Example: A character is angrily walking toward another character. The walk is forceful, aggressive, and forward leaning. The leg action is just short of a stomping walk. The secondary action is a few strong gestures of the arms working with the walk. Also, the possibility of dialogue being delivered at the same time with tilts and turns of the head to accentuate the walk and dialogue, but not so much as to distract from the walk action. All of these actions should work together in support of one another. Think of the walk as the primary action and arm swings, head bounce and all other actions of the body as secondary or supporting action.

## **#9 Timing**

Expertise in timing comes best with experience and personal experimentation, using the trial and error method in refining technique. The basics are: more drawings between poses slow and smooth the action. Fewer drawings make the action faster and crisper. A variety of slow and fast timing within a scene adds texture and interest to the movement. Most animation is done on twos (one drawing photographed on two frames of film) or on ones (one drawing photographed on each frame of film). Twos are used most of the time, and ones are used during camera moves such as trucks, pans and occasionally for subtle and quick dialogue animation. Also, there is timing in the acting of a character to establish mood, emotion, and reaction to another character or to a situation. Studying movement of actors and performers on stage and in films is useful when animating human or animal characters. This frame by frame examination of film footage will aid you in understanding timing for animation. This is a great way to learn from the others.

## **#10 Exaggeration**

Exaggeration is not extreme distortion of a drawing or extremely broad, violent action all the time. It's like a caricature of facial features, expressions, poses, attitudes and actions. Action traced from live action film can be accurate, but stiff and mechanical. In feature animation, a character must move more broadly to look natural. The same is true of facial expressions, but the action should not be as broad as in a short cartoon style. Exaggeration in a walk or an eye movement or even a head turn will give your film more appeal. Use good taste and common sense to keep from becoming too theatrical and excessively animated.

## **#11 Solid Drawing**

The basic principles of drawing form, weight, volume solidity and the illusion of three dimension apply to animation as it does to academic drawing. The way you draw cartoons, you draw in the classical sense, using pencil sketches and drawings for reproduction of life. You transform these into color and movement giving the characters the illusion of three-and four-dimensional life. Three dimensional is movement in space. The fourth dimension is movement in time.

## **#12 Appeal**

A live performer has charisma. An animated character has appeal. Appealing animation does not mean just being cute and cuddly. All characters have to have appeal whether they are heroic, villainous, comic or cute. Appeal, as you will use it, includes an easy to read design, clear drawing, and personality development that will capture and involve the audience's interest. Early cartoons were basically a series of gags strung together on a main theme. Over the years, the artists have learned that to produce a feature there was a need for story continuity, character development and a higher quality of artwork throughout the entire production. Like all forms of story telling, the feature has to appeal to the mind as well as to the eye.

