

Lip-Synching in *Sourdough*

Timothy A. Davis
tadavis@cs.clemson.edu

Rebecca Johnson

Clemson University

Summary

This animation relates the story of a seemingly sweet doughy spokesman that has now gone sour. Through his crusty demeanor and somewhat greasy antics, our hero discovers that if you try to have your cake and eat it too, you just might get canned.

Production included a study and application of lip-synching techniques. All work was performed using Maya, Lightwave, Final Cut Pro, After Effects and Photoshop.

1. Introduction

In the Fall of 1999, Clemson University established the Digital Production Arts program to teach students about computer animation and special effects for motion pictures and television. This course of study crosses traditional academic boundaries by incorporating courses from Computer Science, Art, Theater, Psychology, and English. The awarded degree for completion of the program is the Masters of Fine Arts in Computing.

As part of the educational process, students participate in team animations, similar to those found in the industry, but on a smaller scale. Here, students are exposed to all aspects of the production process: story origination, scripting, storyboarding, modeling, animation, texturing, lighting, dynamics, and post-production. *Sourdough* is one such student production; Figure 1 shows a single image from this animation.

For this work, as with all computer animations, various challenges arise which must be addressed. One of our biggest concerns was the amount of dialogue that was present in the script. We certainly did not want to key-frame every word, so we applied lip-synching techniques in Maya to accomplish the task.

2. Lip-Synching

The first step in the lip-synching process is to create the character's head in a neutral pose. The mouth and surrounding areas can then be separated from the rest of the head for additional work.

At this point, we require that the mouth be placed in various target positions, which will represent extreme poses for particular sounds (see Figure 2). Once these have been generated, we can use Maya's blending features to move smoothly from one pose to another. From this stage, the animator can begin creating words based on basic mouth movement.

As new words are created, they can be placed in a word library. From here, words can be extracted to form sentences spoken by a character, for example Monsieur Cinnamon, the main character in our story. Certain challenges exist, however, to make the lip-synching appear natural.

When applying lip-synching in a naïve manner, the speaking character may appear to be over-pronouncing the words. An approach involving blending across word clips is therefore appropriate. This type of blending will aid in eliminating extreme mouth movement, which will ultimately produce better results.

Additionally, blending will help in reducing the overall rate of mouth movement, which can become quite pronounced due to the speed at which most speakers talk. This effect is further reduced by focusing on the



Figure 1: Monsieur Cinnamon is "lookin' for Sugar"

poses associated with the major sounds of the word, rather than every individual letter. The speed of the recording will also dictate the extent that the word clip will have to be scaled.

To allow additional control of the mouth across words in a sentence, we can apply weights to the individual word clips. For example, a heavy weight on a particular word will add extra emphasis to that word in terms of

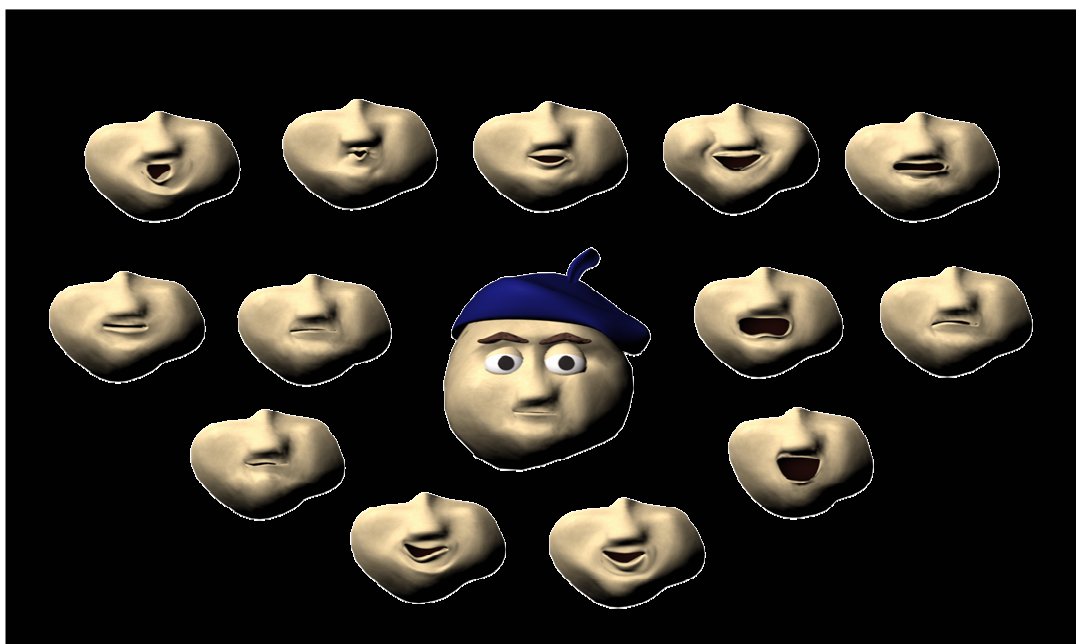


Figure 2: Mouth Poses

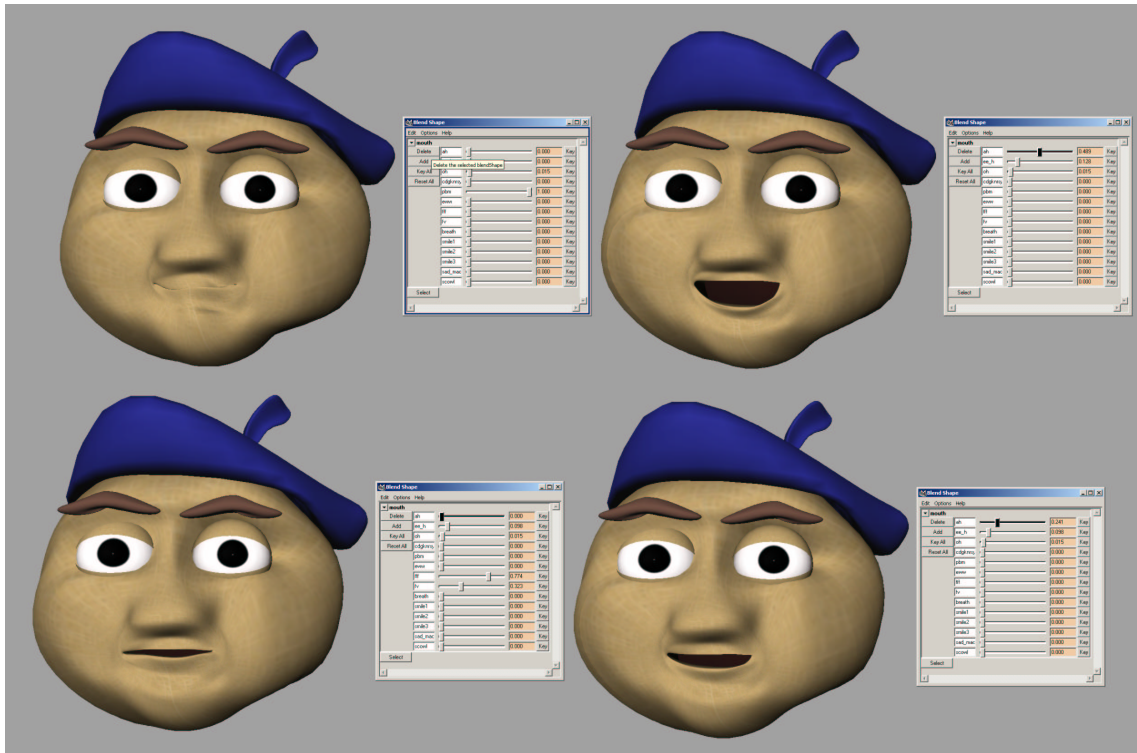


Figure 3: Lip Syncing and Mood

mouth movement, thereby producing the effect of yelling or some emotional trait.

The overall shape of the mouth is important for expressing the mood of the character (e.g., happy, sad, mad, etc.), as shown in Figure 3. To accommodate movement for both phoneme pronunciation and mood, controls must be designed for each. In this way, simply moving a "happiness slider" can influence the shape of the mouth during the pronunciation of word. By making these controls orthogonal to one another, a single word can be "spoken" in a wide variety of ways.

Adding other facial expressions, such as eyebrow movement and pupil size, to represent mood is also nec-

essary for expressing emotion. Without these additional features, any emotion suggested by the soundtrack and lip-syncing will be less effective and will most likely appear out of place.

Lip-syncing is a non-trivial process for computer animation; however, it is absolutely vital for today's productions. We found lip-syncing to be one of our biggest challenges for Sourdough, but the techniques applied here saved us valuable time and effort for the tedious task of lip-syncing. We have further shared our experiences in a lip-syncing tutorial found in [1].

1. J. Kundert-Gibbs, *Maya – Secrets of the Pros*, Sybex, 2002.