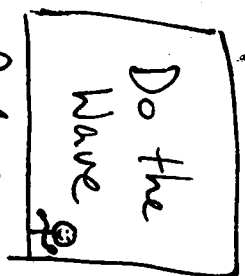


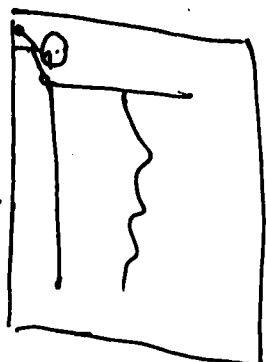
# Tutorial Storyboard



Fade in words



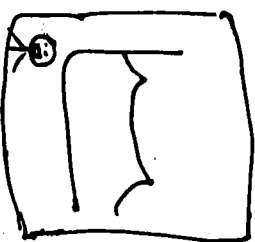
Fade to/From white.  
Session 1, Script 1  
V0



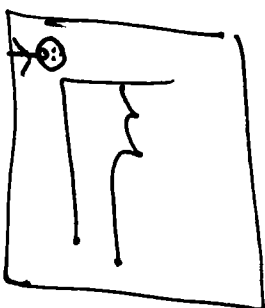
"Watch how the wave moves when I talk."



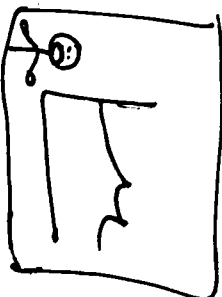
To/From white.  
"Now you try."  
App listens.



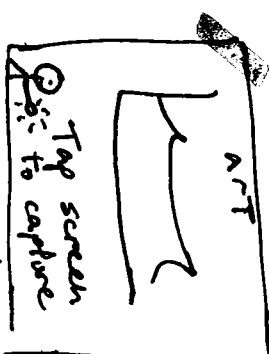
Session 1, #2  
"Watch this - ... vowel sounds - ~~/a:/, /e:/, /i:/~~  
/i:/



/o/



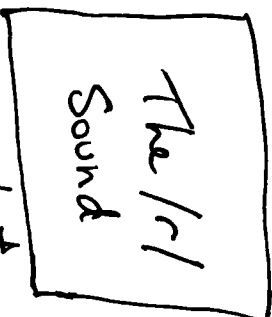
/a/



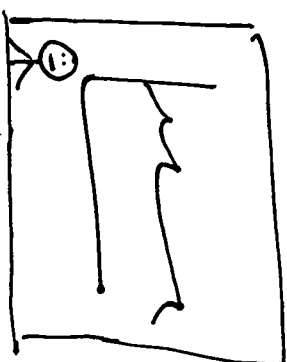
"I can make a tracing of the sound I made. Sustain... bumps line up?"



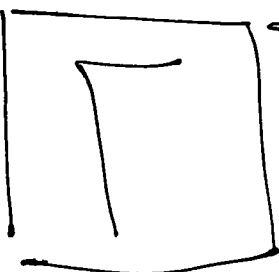
Template choosing as part of tutorial!  
Sess 1, #4.



Fade in/out white



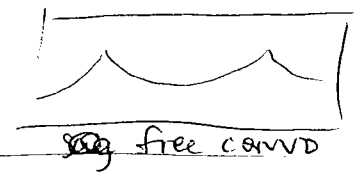
Bad /r/



Transition /r/.  
Guy appears, happy, once good /r/ heard

# Tutorials

• Intro blue wave w/ Demo



ON  
MAIN  
SCREEN

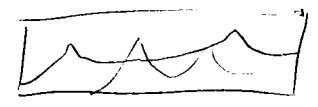
1 INTRO  
to  
BIOFEEDBACK

DEMO  
INTERACTIVE  
+

2 CAPTURE  
MOMENT  
IN  
SPEECH

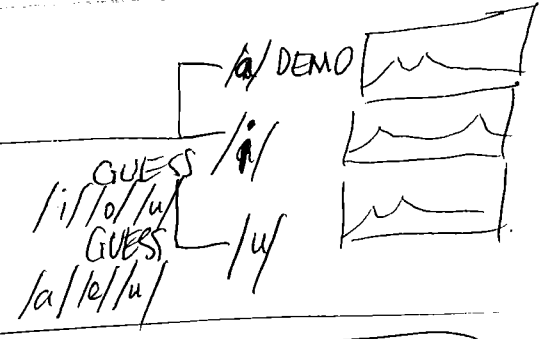
• Press Capture - pic of speech  
@ any moment - try to match/i/

DEMO  
INTERACTIVE  
+



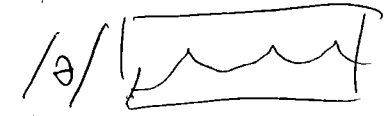
3 BIOFEEDBACK  
LOOKS DIFF  
for VOWEL SOUNDS

DEMO  
INTERACTIVE  
+



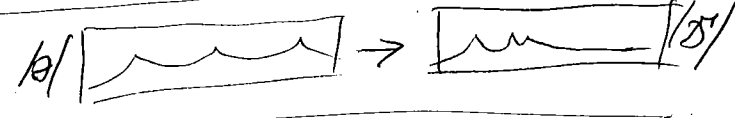
4 INCORRECT /r/

DEMO  
VIDEO



5 INCORRECT  
CORRECT /r/

DEMO  
VIDEO



6 MATCH /r/ in  
words  
STRETCH /r/

DEMO  
VIDEO

"Carrrrr"  
"mrrrrrr"  
"rrrrrrrr"

baseball?  
dance? A few diff examples to choose?

7 CHANGING  
HABIT  
"MIX IT UP"

DEMO  
VIDEO

/u/ → /i/ F2 →  
/a/ → /u/ F1 ←  
/i/ → /e/ F1 →

8 CONTROLLING  
WAVE

DEMO  
INTERACTIVE  
+



9 FREE PRACTICE  
w/ template

Match /r/ w/ playback  
Syllable level /ar/or/..  
word level /r/  
Phrase level /r/  
Sentence level /r/

ON  
MAIN  
SCREEN

10 FREE  
PRACTICE

no feedback  
5 min timer?

## INSTRUCTIONS FOR BIOFEEDBACK TREATMENT—SESSION 1

### Before the session:

- Open CSL Sona-match. Close the 'LPC response window for male.' Leave the 'LPC response window for female' open and load a template of your own /r/ sound.
  - To load a template, go to Target > Open template; go to the 'r treatment study' folder and select the adult female /r/ template (if this does not exist yet, we'll make one—see me for help).
- Open one window to record in by selecting View > Open real-time LPC response window > For child.
- Open three more windows and load one vowel template in each window.
  - Go to Target > Open template; go to the 'r treatment study' folder and select templates for the vowels /i/, /a/, and /u/.
  - Choose templates from the child who is the closest match for the subject you are working with (e.g. 13-year-old male, 10-year-old male).
- **Open two LPC response windows for female and load the sample files 'incorrect r sound' and 'bad to good r sound' using File > Load signal and analyze or CTRL-o (files are located in Biofeedback Study Folder\Templates for biofeedback; make sure to search for .wav files).**

### Script:

1. "This is a program that will make a picture of your speech sounds. The blue wave is actually a picture of your speech." 1
  - <Press record and speak into microphone> "Watch how the wave moves around when I talk."
  - "Now you try making the wave move around."
2. "Watch this--I can make the wave do different things when I say different vowel sounds. What's an example of a vowel sound?" (If participant cannot give an example of a vowel sound, provide examples: "Vowels are sounds like /a/, /i/, and /o/.")
  - "Watch how the wave moves around when I say different vowel sounds."
  - <Sustain the following sounds for 2-3 seconds each: /i, a, u/>
  - "Now you try."
3. "Now watch this—I can make a tracing of the sound I made." 2
  - <Sustain an /i/ vowel, then hit spacebar to stop the recording; CSL should display a popup window indicating that an /i/ vowel was recorded. Hit **CTRL-t** to create a template.>
  - "Look at this red line—it's like a trace or the outline of the sound I just made. Now whenever I make that same sound again, the bumps on the blue wave should line up with the bumps on that red line. It may not line up perfectly, because every sound is different, but it should be just about the same."
  - <Sustain an /i/ vowel.> "Do you see how the bumps line up?"
4. "Now I want you to try. But our voices are different, right? So if you try to match my red line, it may not line up too well. But we also have some lines that we traced from kids whose voices sound more like yours. We'll have you try to match one of those lines instead." 3
  - <Select the window for the /a/ vowel.>
  - "This line shows the shape of another kid's /a/ sound. I want you to say your best /a/ sound into the microphone and see if you can make the bumps line up."
  - <Allow child to play around until a satisfactory match with the template is reached. If participant can't achieve a match, select a different template from the folder>
5. "Now I'm going to show you another line, but I'm not going to tell you what sound it is. I want you to play around with different sounds until you find a sound that matches the line. I'll give you a hint—this sound is either /i/, /o/, or /u/."

<Select the window with the /i/ template and encourage participant to try different configurations until he/she correctly identifies the sound.>

“Great job! Do you think you can do it for a different sound? This sound is either /a/, /e/, or /u/.”

<Select the window with the /u/ template and repeat the process.>

<Provide coaching and repetition until participant can produce a satisfactory match for /i/ and /u/ vowels.>

Now I'm going to show you what the /r/ sound looks like. We're going to see and listen to a recording of someone saying an /r/ sound. First you'll hear an /r/ that doesn't sound so good. Then it's going to change to a good /r/ sound. I want you to watch how the picture changes. Here is the not-so-good /r/ sound.”

- <Click on the window with the sound file 'incorrect r sound.'>

- “I want you to watch for the bump up here.” <Point to the region of the third formant (see REFERENCE), then hit F3 to play the sound, pointing to the third formant. **Hit spacebar to stop during the vowel so that an image of the schwa-like vowel remains on the screen.**>

- “Did you see this bump? Now we're going to hear the not-so-good /r/ change to a good /r/, and that bump is going to move over. It's going to move over so far it blends into this bump <pointing to second formant>, and we won't even see it anymore. Watch this.”

- <Click on the window with the sound file 'bad to good r sound' and hit F3 to play. Point to the third formant and follow its movement as it merges with second formant.>

- “Did you see how the bump moved over when it changed to a good /r/ sound?” <Play the file again until participant confirms that he/she sees the change.>

- “You want to try to do the same thing. To make a good /r/ sound, you want to make the bump move over really far until it's right next to the second bump, or even until they blend together into just one bump.”

7. “Sometimes when we practice the /r/ sound, we won't be doing just /ɜ/. We'll be doing words that have the /r/ sound in them, but they also have other sounds. When you say a word like *rock* or *car*, only the /r/ part of the word is going to match up with the red line. The other parts of the word aren't going to match. That means that when you practice the /r/ sound in a word, you have to really focus on the /r/ part, and stretch out the /r/ sound a bit so you can see whether you're matching the red line. Watch how I do it.”

- <Select the 'LPC response window for female' containing your /r/ template and hit record.>

- “I'm going to say the word 'rock' with a long /r/ sound. Look for the blue wave to line up with the red line during the /r/ sound.” [ɹ:ɔk] “Can you say 'rain' with a long /r/ sound like I did?” <Don't use the CSL yet, just elicit word with prolonged /r/.>

- “Now I'm going to say the word 'car' with a long /r/ sound.” [kɑ:ɹ:] “Can you say 'car' with a long /r/ sound?”

## INSTRUCTIONS FOR BIOFEEDBACK – SESSION 2

Use images in file *Images for biofeedback tx intro 2* (pdf, on tablet).

- “We’re going to keep talking about how you can use our computer program to make a better ‘r’ sound. Remember, we said that this blue wave is a like picture of your speech. <IMAGE 1> Usually you can see three bumps in the wave. Those bumps will move around when you talk. We also talked about the red line you see in this picture. <IMAGE 2> That red line is a picture of really good ‘r’ sound. You’re going to try to make your wave line up with that really good ‘r’ sound. Do you remember what the bumps should do when you make a really good ‘r’ sound? That’s right, you want to make the third bump move over. It should be really close to the second bump. Sometimes they will blend into just one bump, like you see in this picture.” Remember  
like  
1-2  
into
  - “Sometimes it can be really hard to stop saying a sound one way and start saying it a different way. The way you say the /r/ sound now is like a habit that you’ve had for a long time. It can be hard to change a habit you’ve had for so long. [Briefly chat with child to relate this idea to child’s personal experience. e.g. “When you play baseball, did you ever try to change the way you swing the bat?” “Have you ever tried to change the way you do a dance step?” “Is it easy or hard to do that?”]
  - “Sometimes the best way to change a habit is to think about it a completely different way. We’re trying to do that right now. We’re going to focus on what ‘r’ looks like on the computer screen. We won’t worry about what it sounds like, or what it feels like in your mouth. We want you to really focus on the picture. While you watch the picture, try to do all different things to move the wave around.” 7
  - “Sometimes you might make a sound that isn’t like an ‘r’ at all. That is absolutely fine, because it means that you are trying a different way to say ‘r’! The most important thing you can do is change up the way you are saying the ‘r’ sound. Make it a little bit different every time. If you always do the ‘r’ sound the same way, the wave won’t change. You have to try all different things to figure out how to match the red line.”
  - “Let’s practice making the wave move around. We won’t be doing ‘r’ sounds just yet.”
    - “I want you to make an ‘oo’ sound, then change it to an ‘ee’ sound. I’m going to point to the second bump. I want you to watch how that bump moves.” </u/-i/> “Which way did it move? Show me with your finger.” (Second peak, F2, should move right in transition from /u/ to /i/.)
    - “Now I want you to do an ‘ah’ sound, then change it to an ‘oo’ sound. This time I’m going to point to the first bump. Watch how that bump moves.” </a/-u/> “Which way did it move? Show me with your finger.” (First peak, F1, should move left in transition from /a/ to /u/.)
    - “Now let’s start with an /i/ sound, then change it to an /e/ sound. Look at the first bump again.” </i/-e/> “Which way did it move?” (First peak, F1, should move right in transition from /i/ to /e/.)8
  - “I really like the way you were controlling the wave. You can make the bumps in the wave move around any way you want. Just focus on the wave and keep changing the sound until you see the bumps moving in the right direction.”
  - “Now we’re going to try to match some ‘r’ sounds. Remember, you want to focus on the picture and change it up any way you can to make your wave match the red line. Then we’ll play back the video. I want you to tell me when you were closest to a good /r/ sound.”
  - <Participant tries to match target with sustained /r/. Clinician hits stop and then play to play back clip on CSL.> “Tell me when you see the best match for the red line.” <Play until participant has a guess. Provide guidance if necessary.> “What about right here? I saw the third bump move down. Do you think you can make it do that same thing again? Let’s try.” <Repeat for five trials total>
  - “Remember to watch for your wave to get closer to the red line. When it gets close, try to do the same thing again next time. See if you can change it up to make it even closer.”
- 9A  
Free  
practice  
-  
playback