Money Notes

HOW TO SING HIGH, LOUD, HEALTHY, AND FOREVER

Meredith Colby

INTRODUCING NEURO-VOCAL, THE NEW METHOD BASED ON BRAIN SCIENCE

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CHAPTER 3

This is Your Body, Singing

This isn't a biology book; it's a singing method book. But I need to explain the basics of the way Neuro-Vocal Method works in your body. You have to understand it at least a little bit, or you won't apply it effectively. Seriously. There will be a test, so please read. If you don't get the "why," then you probably won't do the "how" in a way that gets you what you want. The test is whether or not Neuro-Vocal Method works for you.

I'm going to describe the biology and physiology with as much Regular Person language as possible. I promise I'll be as brief as possible, and I'll avoid being unnecessarily specific. Just enough to get the point across.

BRAIN NEIGHBORHOODS

Your brain is comprised of three parts: the old brain, middle brain, and neocortex. Part of the old brain is called the cerebellum. The cerebellum is a big contributor to regulating and coordinating movement, posture, and balance. It's called the old brain because we share this anatomical feature with our four-legged brethren all the way back to our evolutionary grandparents, the reptiles. For this reason I lovingly refer to the old brain as the "Lizard Brain." We're going to be seducing your Lizard Brain—which is really only interested in the way things feel to you—and get it to influence your motor cortex.

THE WAY YOU DO THE THINGS YOU DO

There's a piece of real estate in your brain called the motor cortex. It's in charge of a whole lot of files, all collected under the heading "How You Do Stuff." So, for instance, when you catch something that's been tossed at you, you don't think, "I'll now flex this muscle, then this muscle, now relax this tendon, and adjust for this trajectory, etc." Nope. You just reach out and catch. That's because you have a unified

motor response to the instruction "catch." It's called a motor action plan. It means that as you learned to catch things flying your way, your brain bundled all the individual physical movements—along with the visual and tactile information—into one unified action.

To get a sense of what I'm talking about, think about signing your name. You exclusively sign your name with either your right or left hand. Do it with your other hand and it becomes someone else's signature. (Probably someone who's, like, two years old.) That's because you have a motor action plan called *Signing My Name* housed in your motor cortex, and it applies only to one hand. Attempting the same action using the other hand—the one that doesn't have that motor action plan—produces very different results.

Once you have a motor action plan for a specific activity, it's pretty hard to change (as you may recall from when you were fifteen and you tried to change your signature to make it cooler). That's because that motor action plan initiates in response to your intention, not the actual movement. Those ball-catching or name-signing neurons start firing about 100 milliseconds before there's any actual motor response. Then, to make things even harder, you have another neighborhood in your brain called the somatosensory cortex. The somatosensory cortex anticipates how your physical actions are going to feel to you and how objects will feel when you touch them. That's called a forward model.

That, for good or bad, is why it can be very hard to change your singing. You've been singing all your life. You have a seriously complex and unique file in your motor cortex called *Sing*. You have a forward model of *Sing* that anticipates what you'll be feeling when you sing. Your intention to sing opens the *Sing* file, which results in a manner of singing that you've been learning and reinforcing your whole life.

Therefore, if you want to change your singing, you have to change your unconscious motor response to the command *Sing*. You have to carve new neural pathways. You have to build a new—or change your existing—motor action plan; your *Sing* file. To do that effectively you'll need a basic understanding of how things work, and you'll have to (at least temporarily) agree with some of the premises of Neuro-Vocal Method.

Of course, singing isn't the same as signing your name. Singing is an art form. Catching a ball, though miraculous in its way, is gross motor movement. Singing requires a finer coordination as well as a more specific and (often) emotional intention. Because singing is so complex, change can be more difficult. But the payoff is fabulous.

LET'S USE YOU AS AN EXAMPLE

Let's look at your golf game. Or your guitar playing or cursive writing or tap dancing or basketball or trick bike riding or tennis. Call up anything else you might be good at: it doesn't have to be fancy, it just has to be something at which you've reached a level of physical ease.

When you were first learning, and were tackling something basic:

- Playing golf: learning to putt accurately.
- Playing guitar: learning your open G chord.
- Learning cursive writing: connecting your letters.
- Tap dancing: learning your first combination.
- Basketball: learning a layup.
- Trick bike riding: learning a barspin.
- Tennis: learning a backhand shot.

Do you remember what it felt like when you first learned these moves, or some specific physical expression for another pursuit? In the beginning your body felt awkward and wooden. Each time you willed your body to make this particular physical motion, it took time and intention. It also lacked fluency or grace.

And then there was the matter of doing it in such a way that you'd have the option to improve the skill once you mastered it. If you didn't throw in the towel because it was too hard, it started to become more physically familiar. Your body began to anticipate what you would be feeling (forward model) when you went to make that G chord (motor action plan) and you didn't have to think so hard about it. Your effort began to translate into energy, and it all began to feel more enjoyable.

At that point you could focus on your intention for what you were doing rather than simply what you were doing. Instead of just hitting the ball or making the chord or finishing the combination in time with the music, you were able to focus on the manner in which you hit the ball or made the chord or finished the combination. You were able to focus on your intention for the behavior rather than simply the behavior itself. You went through the process of creating a new motor action plan and then improving on it. You made a file for a finer and more familiar execution of that skill, and now you express it in a way that's utterly unique to you—be it a hip-hop dance or pottery throwing, basketball or oil painting.

THE VALVE THAT IS YOUR VOICE

Your body is composed of a bunch of systems—vascular, digestive, nervous, and eight others—each responsible for its unique department. Your voice is part of your respiratory system. Technically it's a valve. Its primary function, biologically and evolutionarily speaking, is to keep stuff out of your lungs. Ever have a choking fit on

a drop of water? Or on nothing? That was your larynx freaking out because some little something got past the first two lines of defense that protect your lungs and made it to the final and most serious sentry—your vocal folds, which are housed in the larynx. As something, however small, touched your vocal folds, a whole series of reflexive responses kicked in and you coughed and coughed until your larynx was satisfied that your lungs were safe.

Where It's At

If you're not sure where your voice lives in your body, do this: Put your hand across your throat, with your hand gently pressed against your neck. Swallow. Feel that knobby thing going up and down? That's your thyroid cartilage, and behind it lie the vocal folds (another name for vocal chords). If you hum while gently placing a finger or two against your neck and directly on top of that cartilage you'll feel the vibration of the folds.

HOW IT WORKS

Have you ever blown up a balloon and then stretched the neck of the balloon so that as the air escaped it made a whining noise? If you haven't, try it. (Or watch someone else do it online.)

I know it sounds silly, but that's an excellent model of how your voice works. If you got the balloon to make the whining noise, I'm confident you went the extra mile and pulled it wider and narrower to make it whine at a higher and lower pitch. When you did that, you made a model of singing.

No kidding. That's how your voice works. The balloon filled with air plays the part of Your Lungs, and the pinched section of the balloon plays Your Vocal Folds. As the air passes through the neck of the balloon it pushes apart the bits you're holding together. The pushing apart and coming back together causes a really fast vibration. The faster the vibration, the higher the pitch. So when you pull your fingers away from one another you create a longer, thinner membrane that then vibrates faster than it did when it was shorter and fatter. When the balloon is out of air, you're out of sound.

In your body, the pinching fingers are cartilage and the balloon neck represents vocal folds. Operating that cartilage are muscles that pull or relax to make the vocal folds longer and thinner (high pitches) and shorter and fatter (low pitches).

Your body is obviously much more complicated than the balloon, but the balloon model gives you an idea of the basic functioning of the vocal folds and how they make sound. Many people don't know where in their body their voice origi-

nates, and most don't have a good idea of how it works. If you'd like more specific and accurate details about the workings of the vocal mechanism, there's much to be found online. Have at it.

HOW IT WORKS DURING A VOCAL "BREAK"

In the last chapter in the section called "Register This," I described how the larynx behaves when it's naturally shifting gears, or allowing for "breaks," in the voice. The vibrations per second reach a certain frequency, which represents a certain degree of tension of the vocal folds, and then the whole mechanism shifts to a different way of behaving, or a different vocal register. This change is sometimes described by singers as a "different voice" because of the radically different timbre they hear and physical sensation they experience.

The Colors of Sound

When musicians talk about the sonic character of a sound, they use the word timbre. It's used to describe the quality of tone distinctive to a particular singing voice or musical instrument. It's pronounced "tamber." Color, texture, weight, and quality can be synonyms for timbre. The timbre of a musical sound can also be described with words like bright, dark, warm, harsh, clear, and so on. Since it can be difficult for us to describe sounds (at least English speakers) we tend to use words from the physical or visual vocabulary to try to describe what we're hearing.

Can Anybody Sing #2

When *"Can anybody sing?"* really means *"Should people who sing really poorly be allowed to sing?"*

Answer: Yes

Because, really, what are your options? Be nasty and rude? Inflict bodily injury on them? Are you really ready to become a member of the Music Police? Sorry, but somebody else singing beneath your standards is beyond your control. So in situations where your delicate sensibilities are offended, you can accept it, relocate, or say a little prayer. What you can't do is tell the offending singer your opinion. Well, you can, but don't. It's mean. And it's not your job.

Compared to the balloon-pinching model of your voice, the model of the vocal break would be more abrupt. In the balloon model your fingers move toward and away from one another in a fluid and balanced way. That's not the way we're put together, and it's not the way your larynx wants to behave, but it is what we want to achieve as singers. We want to be able to access qualities of the chest register (color, richness, and volume) and qualities of the head register (focus, clarity, and nimbleness) anywhere in our entire range. Ideally, we can access all that as an artistic response to the music rather than a technical one.

That's what almost every singer is going for: a voice that accurately represents their musical intention.

The journey may shake up your world a little, but if you want to get there, you can get there.

USING YOUR LIZARD BRAIN

Back when I was talking about your Lizard Brain, motor action plans, and forward models, I also made some tantalizing promises: I promised you'd be making some ugly noises, that your ego would work against you, and that you wouldn't be able to think your way around this process. All that just makes you really excited to dive in, I'll bet.

No?

Well, then, remember instead the part where I said that this is a really short and healthy route to what you want as a pop singer: a strong voice, control over your break, and vocal stamina. Focus there.

Over the years that you've been a singer, you've probably been focusing on what you sound like when you sing. You've been talking about your singing in terms of your voice and how it sounds. You've made changes to your singing, or not, based solely on your perception of how it sounds. You may have kept your sound even if hurt to sing, or left you scratchy, or made you vocally tired. But any changes you made were probably little changes, a change here and there to a word, a phrase, or a style of song. The bigger changes you want, the changes that will give you more volume, range and stamina, are going to come from altering the way you produce sound. That means you'll have to get used to different methods producing different sounds.

YOUR SCIENCE MINUTE

Earlier I talked about the forward model. It's your built-in prediction system for knowing how it will feel when you do something physical. You anticipate escalators, handshakes, car doors, keyboards, and hundreds of other things every day. Familiar motor activities like these have a unified impression in the motor cortex, so you experience "open the door" not as a series of movements and reactions, but as one unified motor response—or motor action plan—to your intention: Open the Door.

Neurons in the primary motor cortex, which is the part of your brain responsible for complex voluntary movements, fire before a movement is initiated. That means that those neurons aren't firing in response to a movement, but rather in anticipation of it. They're firing in response to your intention. They're initiating that motor action plan—a specific, unified, and learned set of instructions that enable you to express complex movement.

Just because a motor action plan is unified, though, doesn't mean it can't be un-unified. If you want to alter your way of doing something you already know how to do, you'll have to break it up into (at least some of) its component parts. Consciously or unconsciously, that's what has to happen to create change in a learned

behavior.

SO WHAT'S THE PLAN?

It's possible to break apart the motor action plan by confusing it with different sensory feedback. Therein lies the magic of Neuro-Vocal Method. With the exercises explained in this book you'll be phonating (which means "any sound you make with your voice") on specific sounds. These sounds are isolated components of singing. Not singing. As you phonate on pitches, you'll focus on physical feelings rather than on singing and listening to the sounds of your singing. This will send new sensory messages directly through your cerebellum and brain stem, your Lizard Brain, and allow you to sidestep your existing motor response to the intention *Sing*. You'll be able to learn new skills quickly and easily outside the boundaries of your existing skill level and beliefs.

TRICKING THE LIZARD BRAIN

All physical movement, whether conscious or reflexive, is initiated in the Lizard Brain. There's a hierarchy of motor function in the brain: simple and autonomic stuff begins and ends in the brain stem, while more complex actions get wired on through the front part of the brain, the cerebral cortex. I'm going to use that fun fact—as well as the fact that I'm a voice teacher, not a doctor or scientist—as my excuse for referring to the system of your unconscious motor responses (your motor action plans) as your Lizard Brain.

Your Lizard Brain speaks the language of physical sensation. You can't use logic or manipulation on it. You can't talk sense to it. It doesn't give a rip how talented or smart you are. You have to get in there and speak to it in its own language if you want it to change or learn. So, since we know that every intention to sing will continue to enlist the exact same result from our motor cortex and its slavish devotion to the motor action plans it already knows, then we'll have to trick it.

Yep, that's the plan: to teach the Lizard Brain new physical feelings and to associate those new feelings with making sounds on pitches. As you feel those new feelings and your Lizard Brain gets happy about them, you'll be sending messages from the Lizard Brain and the somatosensory cortex to the motor cortex. Those parts of your brain that love the new feelings will mess up your existing *Sing* file, allowing it to change as the feelings become familiar. Once familiar, the new, easier feelings organically make their way into your singing and your singing begins to get easier, louder, and

higher. Those feeling parts of your brain reach in and reconfigure the motor response to the intention *Sing*.

If that all sounds difficult, don't worry—it's not. We just have to confuse your brain by giving it different sounds to make and different feelings to focus on. This doesn't give you carte blanche to passively observe the changes. You'll have to help them out consciously as well. But you'll know what you're looking for, and what you're looking for will be based on physical sensation, not sound.

Short version: in order to improve your singing, you'll have to stop singing.

WAIT...WHAT?

In a nutshell, you're going to make noises on pitches. Since you won't be intending to sing, your Lizard Brain won't recognize what you're doing as singing. It will recognize, however, that you're phonating (making sounds with your voice) and that the way you're phonating feels good.

You'll also do some exercises that your Lizard Brain could easily recognize as singing, because they won't sound awful and they'll involve predictable pitches and rhythms. In those cases we'll try to distract the ol' LB. You'll keep your focus on the specific goal of a given exercise—a goal in which the physical feeling represents as much of your attention as possible. So instead of telling your Lizard Brain, "We're singing now," you tell your Lizard Brain, "We're going to be vocalizing on these patterns and we're going to focus on this particular element of how that feels." If you can do that, I guarantee you'll get 100 percent compliance. Your Lizard Brain will be so happy that you're speaking its language—the language of physical feeling—that it will use everything at its disposal (including the sonic information it's receiving) to give you what you're asking for, and give it to you quickly.

Remember, your Lizard Brain really doesn't care how you sound. It leaves that for your neocortex to judge. It cares only about how things feel, and the easier and more natural a motor response is, the happier your Lizard Brain will be. If you've ever had the experience of doing something one way and then discovering an easier way to do it, then you know what I mean. There's a deep-seated sense of relief and recognition that goes along with, "Oh! That's much easier!" We're cut out to do physical things in really efficient ways: when we don't, we really struggle, and when we do, we know in our bones that it's right.

BREATH

Earlier I referred to the fact that breathing efficiently and powerfully is the foundation necessary for intentional, controlled singing. In the case of breathing for singing there's no need to trick the Lizard Brain. It's really good at efficient breathing.

It's been breathing efficiently for millions of years.

Although you'll consciously go through the process of learning to breathe like a singer, you'll soon let that new understanding of an old behavior go back to where it came from. But when it goes back on autopilot, it will be working for you in a different way. Sure, you'll be able to work it consciously any time you want to if the situation calls for it, but if you've got a bunch of eyes staring at you while you sing, are you really going to be thinking about your breathing? Absolutely not. And you shouldn't be! You should be aware of your singing and performance, and your breathing should just work for you. The next step, of course, is not having to think about your singing—to simply be one with the expression of the music.

PLACEMENT

If you've been a singer for a while, and especially if you've taken voice lessons, you've probably come across this word before. It's a very handy concept in singing, and Neuro-Vocal Method makes good use of it.

Placement refers to the singer's experience of the resonance of their own voice. Obviously the "place" the voice originates is in the larynx, with your vocal folds chopping the air into sound. But your vocal folds are responsible for only a part of the unique sound that is your voice. The rest of the sound is determined by your resonant capacity—that is, how you're put together and how the sounds move around in there. That vibrating air you're moving through your vocal folds will bounce around in your pharynx (throat) and your nasal cavities. It will reflect off the hard and soft tissues in your face, head, and neck. It will even resonate, sympathetically, in your thoracic cavity (chest). Aside from your actual vocal folds, it's the size and shape of these cavities (some of which you can change to a certain degree), as well as the hard and soft tissue that surrounds them, that determines your vocal timbre and volume.

SAY THAT IN ENGLISH?

Okay. Imagine you're holding an acoustic guitar and you pluck the E string. It has certain timbre (tone color) that is the result of the string itself, plus the finger that's plucking it, plus the resonant capacity of the instrument (in this case the hollow interior of the guitar, along with the size, shape, and character of the wood creating it). Now put that same string on a violin, and then a cello, and then a soapbox. Even though the string and the plucking finger remain the same, the sound the string makes changes as it resonates with each new instrument.

So it is with you and your singing. Your physical experience of this vibrating air is referred to as placement. Just as the changes to a guitar affect how easily and

efficiently the air within it vibrates, so too can a singer affect the ease and efficiency with which they make use of their own resonant capacity. When you learn to maximize your resonant capacity, it's like pulling a towel out of a guitar. Singing becomes so much easier! Using ease of resonance, or "good placement," is a great way to measure how efficiently you're phonating. Relying on that feeling is a fast, effective, and lasting way to make your singing feel easy, strong, and free from strain.

OVERSHOOTING

There's one more thing I want you to be ready for before you start with the exercises.

Most training in most disciplines, including voice, teaches with the premise that if you're here and you want to get there, then you point and follow in the direction of what you want and eventually you'll get there. Or close.

That probably works well for a lot of things, but not for the Neuro-Vocal Method. After reading the section on motor action plans and how your Lizard Brain works, you can probably see why. Taking little baby steps toward your goal while holding your goal in mind will make your progress very slow. Sometimes it might even keep you from reaching your goals. Remember that you already have a very specific physiological response to the intention *Sing*, and as long as you continue to hold that intention as you open your mouth to sing, you'll keep getting the same response you've always gotten. What changes you do achieve will happen at an infuriatingly slow rate.

In the interest of tricking your brain (and of being impatient and lazy), we're not going to focus on where we're going. Mostly because it doesn't work, but also because we don't really know where that is yet. The sound and feel of your voice resonating efficiently might be very different from what you've felt before, and you'll just have to see what it feels like when you get there.

In the meantime, don't focus on an endgame. As much as possible, try to release your attachment to your current experience of your voice—just allow for the possibility of change. You should focus on mastering the exercises such that you can really work with the "feeling center" of each one. Know that they're not pretty, don't try to make them relate to singing, and just do them.

Then watch the magic happen!

THE NEURO IN NEURO-VOCAL METHOD

Now that you know more about how the brain makes your body sing, let's look at what singing makes your brain do. For those of you who don't scour the neurology blogs, let me fill you in a little.

Our understanding of the human brain has progressed by leaps and bounds

since the final decade of the twentieth century. Although the Greek philosopher Plato was the first guy we know to have written it down, people have believed for a long time that humans do their thinking with this organ called the brain. And since we humans are very interested in our own selves and what we think, considerable time and energy has gone into the study of the brain over the last couple of millennia. But in all that time we learned hardly anything compared to the discoveries of the last few decades. That's primarily thanks to functional magnetic resonance imaging (fMRI), a relatively new technology which allows scientists to "look" at the brain of a living person while the person is actually using their brain.

You've probably heard of MRI, the diagnostic technology that's largely replaced the x-ray. It uses radio waves and magnetic fields to create images of the body. The fMRI uses the same sort of technology. It measures brain activity by detecting changes in blood flow. Different parts of your brain are activated depending on what you're doing, thinking, or feeling. When you use your brain, the parts you're using ask for more blood flow, and an fMRI can see that.

I had the opportunity to talk with some doctors of the brain persuasion about the Neuro-Vocal Method and why I think it works. They responded exactly as any self-respecting scientists would: they listened and nodded and said things like, "Yes…that sounds like it could be." Which, in case you don't know any scientists, is almost like getting an agreement. So I was very encouraged. A charming, piano-playing neurological researcher named Dr. Doug Burman thought my theory was interesting enough to put me in an fMRI and look at my brain as I executed the elements of Neuro-Vocal Method.

If you're interested in the "Neuro" of the Neuro-Vocal Method, then read the rest of this section. If you're not, then I'll just sum it up, and you can look at the creepy brain pictures and move on.

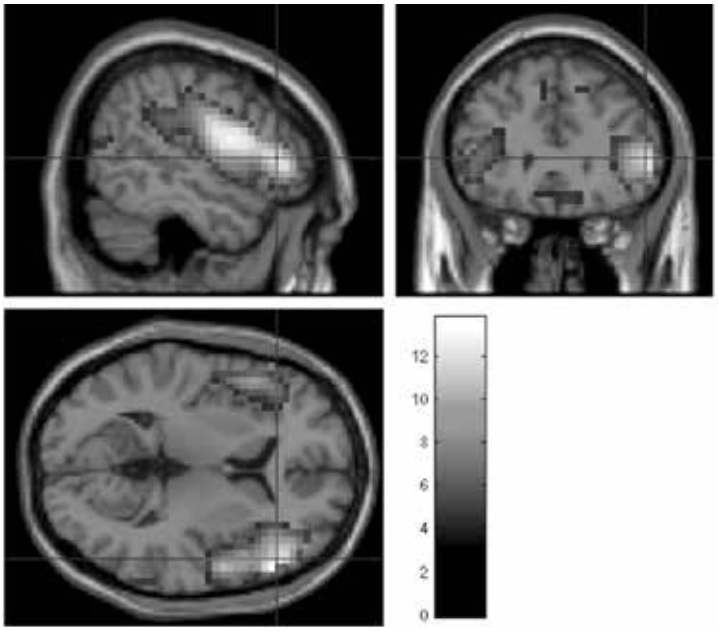
The upshot is this: the brain knows when it's singing and when it's not.

The difference in brain activity between singing and doing Neuro-Vocal Method exercises is very easy to see in an fMRI. The underlying theory of the method is that if you can make sounds and patterns in a prescribed way and on given pitches, you will allow your brain to create new neural pathways in response to the intention *Sing*. If the sounds and patterns you're making use your entire vocal mechanism in the most natural and efficient way possible, then that physical behavior must integrate with the similar behavior of singing. The new feelings and behaviors influence the singing so that it becomes more natural and efficient. Natural and efficient translates to louder voice, bigger range, more stamina, and better vocal health.

A BRAIN THAT'S SINGING

When you express the intention to sing, that expression represents a very complex neurological response. Really. A lot goes on in your brain when you sing.

Here's an fMRI of a brain singing "What a Wonderful World." The colored parts are the most active regions of the brain. If you've never looked at this sort of picture before, you should know that this is a very busy brain. Singing produced activity in an unusually large number of neurological neighborhoods.



Apparently brains are very interested in singing; it really keeps a brain busy. Especially interesting is the degree to which the activity is bilateral, meaning the same areas are active on both the left and right sides. That's pretty unusual. Not many activities create that mirror-image activity between one side of the brain and the other.

Here are the regions of the brain activated by singing, and the stuff those sections are busy doing:

Bilateral inferior frontal gyrus

- A lot of activity here (bilaterally). Activity encompasses Broca's area (language) and extends to areas for vocalization.

Orbitofrontal

- Pleasure. Emotional response.

Medial superior frontal

- Feedback-related self-monitoring of task performance.

Brainstem

- Motor function.
- Motor and sensory to the face and neck.
- Cardiac and respiratory functions.

Somatosensory cortex

- Touch, physical feeling. Anticipates and processes sensations.

A BRAIN MAKING A PITCHED SOUND

This is a picture of a brain holding a tone on the Nasty Vowel (Exercise 5.1). There's no melody—just a single pitch—and the sound being made isn't a singing sound. It's much more like a pitched speaking sound with no intention to be musical or pretty. You can see how much less is going on by how few areas of the brain are active. The brain just isn't working as hard or in the same ways it does when it's singing.

Here are the regions of the brain activated by the activity of holding a single tone on the Nasty Vowel and the work they do.

Bilateral anterior temporal lobe

- Not conclusive, but area includes sensory association cortex. Probably indicates the singer feeling what she's doing as well as measuring the physical sensation.

Orbital frontal region

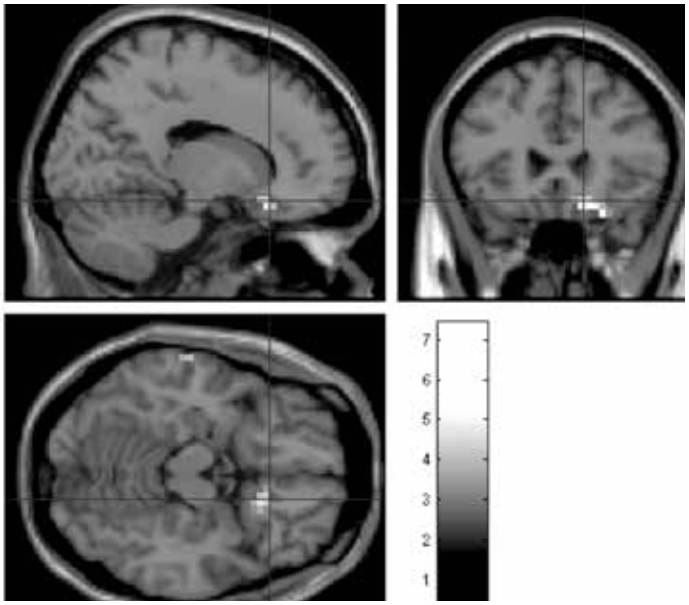
- Pleasure area. Signals information about expected outcomes. Integrates information in real time to make predictions or estimates about future outcomes.

Lateral inferior frontal

- Speech area. Motor function of making sound, physical coordination for speech. Also hearing and language.

A BRAIN MAKING A PITCH PATTERN

In this picture the phonation being made is the Nasty Triangle (Exercise 1 in the Skill Development section). Compare these pictures to the pictures of the singing brain. Most importantly, there's very little activity here. The regions activated here are also not the same as the regions activated by singing. This brain is allowing the singer to make pitch patterns (like singing) and efficient vocal sounds (like singing), but it doesn't seem to think that it's singing.



The regions of the brain activated by the activity of doing the Nasty Triangle exercise follow, along with what those regions do.

Superior temporal gyrus

- Activity primarily in auditory area, involved in auditory processing. This gets activity any time you phonate because you hear yourself.

Orbitofrontal cortex

- Small amount of activity here can represent information about the specific features of expected outcomes of behaviors. Indicates learning about reward-relevant events.

These fMRI images are basically illustrations of what I described earlier with regard to the Lizard Brain.

Although these pictures are pretty darn science-y, they don't represent actual data. You'd need a whole bunch of people doing exactly the same thing, along with some who are not doing the same thing, and a certain number of them would have to get results similar to one another to support a scientific theory. And even then, it's still just a theory.

Luckily, I'm a voice teacher and this is a vocal method theory. I know that Neuro-Vocal Method is powerful and fast at getting the promised results. The part that's still a theory is the "why." The results are reliable.