But Why: A Podcast for Curious Kids

Are Yawns Really Contagious?

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[Jane] This is But Why: A Podcast For Curious Kids from Vermont Public Radio. I'm Jane Lindholm and I'm just as curious as you are.

I love seeing all the questions that you send us. I take them and it's my job to find somebody interesting to help answer them.

My friend Melody Bodette works on the show too. You don't usually hear her voice but she's busy researching all kinds of things and looking for really cool people for us to talk to. If you have a question, have an adult record it on a smartphone and send it to questions@butwhykids.org. We are up to questions from kids in 39 states, six Canadian provinces and 16 countries. If you want to see where all the states and countries are, go to the But Why Kids Facebook page we have some maps up there. If you like the show spread the word so we can hear from even more people and places.

In our last episode, we started learning about how our bodies work. We talked about why our hands and feet get wrinkly in the bathtub. Turns out it's a little bit of a mystery, but it might be a way to give us more traction in slippery conditions. That's amazing, that our bodies change according to the conditions we're in. We also talked about why we're ticklish why some people have freckles and why it seems like our noses and ears keep growing after our bones stop getting longer.

So go back and listen to that episode if you missed it. But you have sent us so many questions about bodies that we had to do a second episode just to fit them all in. And we're not even talking about eyes today. We still have to do another episode all about how we see sometime later this year. We've brought back our pediatrician friend from last episode to answer a few more of your questions. A pediatrician is a doctor who works with kids. That's the job Dr. Lori Racha has at the University of Vermont Children's Hospital. Let's not waste any more time and we'll get right to the questions.

[Max] Hi my name is Max. I'm nine years old and and I live in Escondido, California. My question is why do we get hiccups?

[Jude] Why do we hiccup? Is it triggered by laughing?

[Jane] That's Jude who's 10 years old and lives in Waitsfield, Vermont. And here's one more on this topic from Estelle.

[Estelle] Hi, my name is Estelle. I’m two years old and I’m from Nashville, Tennessee. I’m wondering why I get the hiccups?

[Lori] Hiccups are some of the most interesting, fun things, that I think our body does. Hiccupping occurs really early. So when we are the developing baby in our moms' abdomens we are making hiccup sounds. One of the things that really makes sense to me is the response to hiccups after eating. So there's a nerve that actually runs on the underside of the stomach. If you take your hand and you kind of make a fist that's about the size of your stomach. Now when you eat food that stomach expands and gets bigger, kind of like a balloon that you're blowing air into, but this is your eating food. And when that expands it triggers that nerve that's on the underside of the stomach to say "oh I'm getting expanded" and it causes this funny little contraction of the muscle in your chest, lower chest that's involved with breathing called the diaphragm, and it causes these hiccup. As you get older, it's almost like the body gets more used to this, right?

That OK, the stomach, it's kind of predictable, they're eating again, the stomach is going to get bigger and you tend to have fewer hiccups as you get older. Many kids can have learned that they can kind of make themselves hiccup by swallowing a lot of air and that can also make you burp. Is it triggered by laughing when you laugh? I think this was Jude's question when you laugh you do tend to swallow a lot of air. Laughing and crying actually both are situations where you can develop a lot of air in your stomach. And again I think that can trigger a trigger the hiccups too, so I guess the answer is yes. And sometimes hiccups just happen and it's not related to eating or anything else.

But there are some things that you can do too. It does seem that if you drink some water sometimes that will help alleviate hiccups. Eating something sweet, now again, this would be a treat. This would not be something that we would want to do all the time. But sometimes eating something sweet seems to relax some of the muscles that are involved with hiccups and that can be helpful as well.

[Jane] I want to know about the craziest way you get rid of hiccups what has actually worked for you. Do you stand on your head and drink a cup of water? Do you swallow a spoonful or two of sugar? Do you get your friend to scare you? Tell us what works for you. My mom always tried to scare me and I don't think it really worked. OK here's another question.

[Jacob] My name is Jacob and I live in Fairfax, Virginia and I want to know when your baby tooth falls out, why doesn't the root come with it?

[Madeline] Hi I'm Madeline and I live in Winnetka, Illinois and I am five years old. I have two loose teeth and I want to know how teeth get loose.

[Jane] This is kind of amazing, but when you lose your baby teeth and they don't have any roots it's because the root was there but it disappeared. Your body actually absorbs the root of the baby tooth when the big tooth starts coming in and pressing on it. This thin baby tooth root gets absorbed and that's what makes your tooth get loose because

it doesn't have that anchor of the root keeping it in your mouth. Eventually the root is totally gone and your tooth falls out. This only happens when you've got a big tooth ready to come in. It would be pretty tough to eat if you lost all your baby teeth and had no big teeth ready to take their place.

Now it's time to tackle this question.

[Liron] Hi I'm Liron. I'm nine years old and I'm from Riverdale, New York. And my question is why when we're tired do we yawn?

[Maya] My name is Maya. I'm 12 years old. I'm in California. Why are yawns contagious?

And here's Olive who's six years old and lives in Seattle Washington and she joins Maya in wondering…

[Olive] Are yawns really contagious?

[Lori] Even talking about yawning, up to 50 percent of people will yawn, just hearing that someone is talking about yawning, so it's really, really interesting. So this question is actually one of the harder questions that I was asked because there's much that's not understood about yawning and there are several different ideas of why people yawn. And so I'm going to share those with you. But I hope you're not disappointed if I can't give you this is why for sure.

So one thought is that there's some belief that even the very earliest human, so even before there was like a real communication system of language, that early humans would yawn and that maybe was a way for them to signal to each other that maybe their level of alertness, that they weren't going to be able to watch out for that big predator animals or something like that, or to signal that maybe it was then time for everyone to go to sleep. Maybe it was a way in early humans of coordinating some of their sleep activity.

One theory also says that it may just be simply mimicking behavior. And so I don't know if any of you have noticed that if you are, you see someone and they are smiling that you are likely to smile back. Right? And so that's just a simple mimicking behavior. I don't think we're telling ourselves, "Oh I really, this is one of those times I must smile." But just seeing the human face with a smile often causes us to smile back. And that's a very good reason for all of us to smile as much as we can because I think it's important for all of us to do our part to try to keep people feeling positive and happy.

Another factor is that your age plays a role, so even though babies, as soon as they're born they can yawn, they don't have contagious yawn, so it doesn't seem that humans become contagious yawners until we're about age four. The other interesting thing to

know is that humans and other social mammals, so animals that kind of, you know, work together, have some kind of communication with each other are the only living things that we know of that have contagious yawns. So it does seem to be something important to our social structure or how we are with other people. But I can't tell you exactly why that happens.

The last thought that I wanted to share with you was that some researchers feel that yawning may have a role in helping to keep the brain's temperature down. So that sounds kind of funny how that could happen. But if you think about it our bodies are about 98, 98 and a half degrees Fahrenheit in our outside world is usually cooler than that. So when we yawn we bring in a lot of cool air into our mouth above our mouth is the palate, but above that is the sinuses and actually then the base of the brain. So when you're bringing in cold air you may be having a little bit of a cooling effect on the brain.

Now when I have a fever I don't feel like I yawn more. But I don't know if I've really thought about that but that's another interesting thought about what yawning could do.

[Jane] So what do you think about what Dr. Racha says? It still seems strange to me that just thinking about someone else yawning can make you yawn. Sometimes my dog yawns and I've noticed that when I'm watching my dog and he yawns, I yawn right back.

OK let's tackle something else now. We're going to get into some questions about balance and dizziness and equilibrium. That's when two opposing forces are in balance. Phoebe lives in Vergennes, Vermont and is eight years old. Here's what she's been wondering.

[Phoebe] Why do your ears pop when you're driving up over the mountains?

[Lori] With this question I think we need to think about pressure. Your ears are set up that you have your outer ear, that's the part you actually see. And then there's an ear canal so when your doctor looks in your ear, they're putting something, a flashlight, in your outer ear, the ear canal. They're shining something, that light, on something that looks like a piece of saran wrap, or plastic wrap. It's just a thin clear, you can see through it, shiny, little membrane that separates the outer ear and ear canal from the middle ear space. OK. So and then there's even further in, there's an area called the inner ear. But we're going to focus, kind of, on how the pressure, which is the feeling you get when you go up over a mountain, or when you're going on an airplane and the plane’s rising, you get a feeling and we call it pressure that something's building up, kind of, inside your ear. And sometimes you'll feel even a little pop that occurs and then that feeling kind of feels a little better like less of that pressure. And so that pop is caused by something called the Eustachian tube.

[Jane] You'd better spell that because that's a funny word.

[Lori] It's a really funny word. It's E-U-S-T -A –C-H-I A-N tube. And so the Eustachian tube has a really important job of causing pressure to equalize between two different spaces. And so when you're going up over that mountain the pressure around your body is actually getting less as you go up, right? And an airplane at pressure gets less. And so the middle ear when it had pressure in there is now higher than the air pressure surrounding it. And so when your Eustachian tube is working properly you might feel a little pop and then the extra pressure in the middle ear is able to be released and you have relief.

Now why does it hurt? Well, that's implying that your Eustachian tube is not able to release that extra pressure and that is very painful. So if this happens to you, you can try a couple of things. Oftentimes people tell you to chew gum or to swallow when you're swallowing and chewing the Eustachian tube is getting stimulated, kind of, to open and close. And so even if it's not working at its best it's getting more opportunities to try to release pressure and so that's a good a good thing to do. The other is kind of a funny idea if you plug your nose in almost like you're pushing against your plugged nose. Sometimes that will help pop open the Eustachian tube a little bit and relieve a little bit of pressure. Sometimes I even tell kids, plug your nose and then pretend you're trying to have a poop. I know that sounds very silly but that, work, we call that Valsalva Maneuver, causes it more likely to have that pressure aid the Eustachian tube for opening back up.

[Amelia] I'm Amelia, from Montpelier. I'm five years old. I want to know why I get dizzy when I spin?

[Sara] My name is Sara and I'm eight years old and I live in Florida. And my question is why do we get dizzy when we spin around in a circle?

[Zoe] Hi my name is Zoe. I am eight years old. I live in San Jose, California. And my question is why do people get dizzy?

[Lori] I explain this, I want everyone to think of the image of a hula hoop and especially if you've ever used a hula hoop that has either sand in it or water, so that once you get that hula hoop spinning there, even when you stop there's still water or sand spinning around in it. OK, and now imagine that you have three hula hoops and some are kind of oriented up and down, some side to side, and maybe another one kind of in-between, like a diagonal, so they're all three pointing in different directions. OK. So inside your ear is a part of your ear that has basically something that's shaped as I describe three different hula hoops in different orientations. And so when you spin so either you're rolling down a hill or you're spinning around in a circle. There's fluid inside those, like a water that's inside those hula hoops and they start spinning. Now when you stop

spinning, you still feel like you're spinning because the fluid in those little hula hoops inside your ear are still spinning, and it's giving you a sensation of spinning still. Because the way that those hula hoops are working is that they determine your position in space. So kind of I'm leaning to the left, I'm leaning to the right. It changes where that fluid is going and there's little nerve cells inside those hula hoops that bend sending messages to the brain, ‘Oh they moved this direction,’ ‘oh they moved to that direction.’ But when you're spinning you're kind of causing those all of those nerve cells to fire in one direction all the time. And then as the water keeps spinning it's continuing to send those messages.

[Jane] Even though you have stopped your body.

[Lori] Even though you have stopped your body. It still does that. Now many kids have figured out that if you stop and then spin the other direction you will recover from your dizziness faster. And that's because you're causing that fluid to shift again and to go in a different direction and to be able to settle more quickly.

[Sam] Hi But Why. I’m Sam from Dayton, Ohio. My question is why do you get dizzy when you're spinning around but not when you're spinning with the earth?

[Jane] Hey Sam, do you remember what Dr. Racha was saying about our inner ear? How there's liquid moving around inside your ear that helps your brain understand how you are moving. You generally get dizzy because you're moving in different directions and your inner ear can't keep up and your brain gets all confused by the signals and that makes you feel dizzy or sick.

The earth is moving very fast. It spins around at a thousand miles an hour and it's actually moving around the sun which takes a year at an even faster speed, 67,000 miles an hour. So you would think that rotation would be fast enough to make you really dizzy. But it doesn't because you and I and our schools and our homes and our sidewalks and everything on the Earth is traveling at exactly the same speed on the earth and it's a constant speed. If the earth suddenly stopped we would feel that and that would probably make us really dizzy. But as long as we are all moving in a constant direction at a constant speed we don't get dizzy. Think of it this way if you are riding in a car on a very flat highway and you close your eyes you might not even be able to feel that you're moving even though you're actually moving very fast. But if the car starts slowing down and speeding up or going around a steep curve and then turning and going in a different direction, you'll definitely feel that. And that might make you dizzy or sick.

Here's a question from Calliope who lives in Portland Oregon and is five years old.

[Calliope] Why do people slip?

[Jane] The basic reason we slip Calliope is because of something called friction. Actually it's because of a lack of friction. Friction is when two things rub together. If you try to rub two rough surfaces together, like Velcro, they stick to one another and it's hard to move them back and forth, right? But if you take two smooth objects and rub them together they glide back and forth and they don't stick together at all.

When we put our foot down on a hard surface like the sidewalk there's enough friction that our foot stays right where we put it. But if you put your foot down on a slippery, wet bathroom floor or on an ice covered path there's not enough friction to keep your foot in place and you slip. Dr. Racha says one of the things she thinks is amazing is how often we almost slip and then don't.

[Lori] More often than not we catch ourselves. In fact this happened to me this morning I was on a sidewalk and it was a little bit icy and I didn't notice it and my feet started to go further out in front of my body than the rest of me. But yay, from my body I didn't fall. And it's because as I started that motion the nerves in my body were getting information that my body was going in a different path than some parts of my other parts of my body. And I was able to do some reflexive movements so those are movements that I didn't really have to tell my body, you know, upper body swing forward or arm put your arm out.

Those things just happened which is really helpful because to try to think of how I would have corrected that at the time, I don't think I could have. And even now I don't really even know how, why, how I didn't fall but quick information that goes from the parts of your body right to your spinal cord. So you don't have to say how you feel about that my body is trying to make this change. It just happens right away. Lucky for us we have these reflexive movements that can help us, you know, many times prevent us from falling and sometimes will fall but probably even then we still have maybe our hand out or our leg out in a way as to kind of break the fall a little bit.

[Kayla] Hi I'm Kayla, I’m 9. I live in Flagstaff, Arizona and I want to know why people faint?

[Lori] Why do people faint? So this is an interesting question. The very simplest answer would just be that when the brain does not get enough blood flow or oxygen to the brain it decides it has to do something very quick and very purposeful to get more blood to come to it. So as people stand upright, our blood has to be pumped up to our brain, right? It has to go against what we call, gravity the force pushing everything towards the ground. And so if you're not getting enough blood to something up high, the best way to get blood there is to go low. So fainting makes your body fall to the ground and then your brain is at the same level as your heart when you're lying down. So it's easier for the blood to go back up there. There's certain things that make you more likely to faint.

So when you're in hot weather standing for a long period of time, if you haven't had enough to drink, and we call that dehydration, those can all contribute to that problem. And that's because if you're not drinking enough water your blood is actually not, there's not as much of it is when you drink enough water. And so it makes it harder for the blood to get up to the brain.

If you feel like you're feeling a little faint, like you might pass out, the best suggestion is go to the ground. So sit down put your hands your head in your lap or lay down and put your knees up. And you'll find that oftentimes that relieves that sensation. It's always a good idea to tell someone too, like I'm not feeling well, because we don't want you to fall, because then you could hit your head or something you know you could injure yourself in another way.

[Jane] OK. Here are a few questions about things that happen in your mouth.

Here's Myra from Morehead, Minnesota.

[Myra] Why do girls have more taste buds than boys?

[Lori] I wasn't aware of that. That wasn't something that I knew, and I actually am married to an ear nose and throat doctor and he actually asked another person in his department who's an expert on taste and smell. And actually, we don't know of a difference between boys and girls. However on an individual basis the number of taste buds and also the number of nerve cells on the tongue that are sending messages to the brain about what it's experiencing or tasting varies from person to person. So I may have many fewer taste buds than you do but it's not based that all girls or all boys have more.

Here's another question, this one is from Emmett. He's 7 and lives in San Francisco.

[Emmett] Why do we have saliva?

[Lori] What is saliva, for the kids who don't know, it's that watery substance that's produced in our mouths. It's almost entirely water, it's 98 percent water. And then it has very small amounts of things called electrolytes, which are little salts. It has some mucus in it and enzymes and the enzymes are important because those are chemicals that helped start the breakdown of food. There's also a little bit of antibacterial substance in the saliva, so it's fighting germs as well.

So the food that we eat some of it is wet and some is dry but the saliva really helps us make the food more moist so that we can swallow it easier. And if any of you have ever tried to swallow something that was kind of dry, you probably are reaching for your water, or your glass of milk to try to help get that down into the back of your throat and

the enzyme that starts the process of digestion is called amylase and that's something that we have in the saliva.

[Jane] Emmett had another question as well.

[Emmett] Why do we have mucus?

[Lori] Mucus, you know compared to saliva, I would describe it more as like a sticky, slippery kind of substance. And it is produced in so many different parts of the body in things called mucus glands. The majority of these are located in our G.I. system, our gastrointestinal system, which is involved in digestion. But we also have it in our respiratory tract and in other parts of our body too. I mean some areas that we don't think about as much as in our visual system, so our eyes produce mucus and our ears do as well. Mucus also has some anti-septic, or sort of fights infection properties, and especially if it's a part of our body that has some irritation the mucus cells produce more and it takes a while even after the infection has gone for that mucus to, kind of, decrease a little bit. But one of the areas of the body that I think is just, this is amazing. Your nose produces one liter of mucus a day, even when you're healthy and you don't even realize that because when mucus is sort of at its best, working its best and you're feeling your best. It's a very thin sort of a material and you're swallowing it throughout the day and you don't notice it but you would really miss it if it wasn't there, your nose would feel very dry, your throat would feel dry and itchy all the time.

And so mucus is one of those underappreciated parts of the body because it really makes us feel so much better. And we only seem to complain about it when, you know, we're sick and we have more of it. But it's really doing a lot of lubrication keeping things moist and working well all the time. So you know let's, let's be a little more supportive of the mucus I think.

[Haven] Hi, my name's Haven. I'm seven years old and I live in Mumbai, India. My question is why do people cry when they get hurt?

[Lori] Oh, this is a really interesting question. So in just a nutshell crying is a release of a build-up of energy. Right, it's feelings. And we think of crying as usually a response to getting hurt. But we also have to think about sometimes we cry when we see something just beautiful. So it can be a good thing too. So what actually is happening is there's a part of the brain called the limbic system and this is the part of the brain that deals with emotions and feelings. When it gets stimulated it sends out a chemical message through something called acetylcholine. It's a very fancy word which basically is just a little messenger that goes to that autonomic nervous system that part of your body that's taking care of all those things that you don't have to tell it to do, to signal the lacrimal system, which is the part of the body that produces tears, to start making tears. And so you know simply put you have an emotional reaction to something causes your nervous

system to say start making the tears. And then back to that lacrimal system. Again though when we were talking about tears our eyes are doing tears for other reasons too not just in response to emotion.

There's three different types of tears, so the ones in response to feelings and emotions. Those are called emotional or psychic tears. But then there's the tears that are just the hard workers there all the time in our eye making it our eyes moist so our eyelids aren't getting stuck on our eye and feeling uncomfortable and itchy and dry. And those are called basal tears.

[Jane] Not like the plant.

[Lori] Not like the basil plants. I would think that basal is like baseline, like just always there.

[Jane] There's actually a third kind of tear called a reflex tear. Those tears happen when your eye gets irritated. There are the kinds of tears you get when you chop onions. We will have more on tears in a future episode. We're almost done with this very long episode today. But first a wiggle break.

[Singing] Head, shoulders, knees and toes.

[Jane] Those were our friends Robert Resnick, Gigi Weismann and Carol Scrimgeour. You know, how they were laughing at the end there? Do you know how they did that how our vocal chords work? Well some of you were wondering.

[Fiona] My name is Fiona. I'm 6 years old. I live in Hancock, Michigan. And my question is how do voice boxes work?

[Lori] This is a great question. I really enjoyed working on this idea. So how does our voice work? Well, you can think of this is three parts working together. You need a power source. And so in this case the power source of our voice is our lungs, so it has all this air in it. The second thing we need is a vibration source, so something that's going to cause you sort of that power source to have something that it can transmit. That's your voice box or your vocal chords. And the last thing is called a resonator. And I think of this as sort of the thing that finishes the sound. And this is your throat, your nose and your mouth also your sinuses. So to go through the process when you exhale or let air out of your lungs it travels from your lungs up through something called the trachea or windpipe. This air moves through the vocal chords which are kind of V-shaped in your neck. And as the air goes over them it causes them to vibrate when you have more air coming through, your sound is louder and less air makes you softer.

The voice box is also called the larynx and it sits on the top of the windpipe. It has these two vocal cords. As I said kind of V-shaped that start to vibrate when the air passes

through and everybody's vocal chords are different kind of the length of your vocal chords. Also how tight they are determines the pitch, or kind of the sound that you're that you're making. And you can alter how high or low you speak with your voice based on how tight those chords can become and that's controlled by muscles and your neck. Lastly after the sound goes through the vocal chords and at this point the sound would be like the sound of a kazoo. Just that. And so it doesn't sound that human like at this point. And so it goes through the sound finisher and that's what we call the resonator. And in humans and people this is your mouth cavity, your nose, your sinuses and how the vibrations move through these cavities determines what your sound is like. And so some people have a more nasal quality to their voice. And so maybe more of the sound is directed through their nose but everyone's voice is very different and unique. And it's because of how it travels through the end that it goes. And so when you have a cold your voice changes and that's because the finisher, the vibrations going through your mouth your nose and other sinuses are kind of different because they might have congestion or more mucus in them. And so it changes the quality of that sound. And then when the cold goes away you result back to your normal voice again.

[Kahlea] My name is Kahlea. I live in Santa Monica, California and I'm 11 years old. My question is why does your own voice sound weird when recorded? Thank you.

[Jane] This is something I know all about as a radio host. The first few times I heard myself on the radio it sounded so strange. It didn't sound like me at all and it actually was kind of embarrassing. Over time I've gotten used to it. But it definitely takes awhile. I think one of the reasons it sounds weird is just because we are often critical of how we look and sound and that's too bad. But the actual scientific reason why it sounds different is because when you're talking normally you're hearing your voice through the air just like you hear everyone else's voice you're also hearing your voice conducted through your bones. So you get used to the way your voice sounds both through the air and conducted or transported through your body those sound waves move through your body and you get to hear both ways that the sound travels.

When you hear a recording of your voice, it's just the sound that's conducted through the air and you hear your voice the way everyone else hears your voice and it sounds strange, at least to you, it doesn't sound any stranger to anybody else probably. So did it sound strange to you when you recorded the question for this podcast? Whether it sounded weird or not it was a great question and I'm really glad you recorded it.

And thanks to all of you who sent in your body questions to the rest of you. Thanks for listening to the whole episode. This was a long one, but I hope you learn something new about your amazing body. We love getting your questions on every subject under the sun. If you have a question you want us to try to answer have an adult record it on a smartphone memo function and then e-mail it to questions@buthwykids.org. We have

instructions up on our Web page butwhykids.org. Be sure to tell us your first name, where you live, and how old you are. Have a look at our Facebook page if you want to see those maps of where all our questions have come from so far, and if you want to meet some of the kids who've been asking them.

But Why is produced by Melody Bodette, and me, Jane Lindholm, for Vermont Public Radio. Our theme music is from Luke Reynolds. We'll be back in two weeks. Until then, stay curious!