# # 1. Why we laugh

Did you know that you're 30 times more likely to laugh if you're with somebody else than if you're alone? Cognitive neuroscientist Sophie Scott (University of London) shares this and other surprising facts about laughter in this fast-paced, action-packed and, yes, hilarious dash through the science of cracking up.

Accent: The speaker is British

00:11Hi. I'm going to talk to you today about laughter, and I just want to start by thinking about the first time I can ever remember noticing laughter. This is when I was a little girl. I would've been about six. And I came across my parents doing something unusual, where they were laughing. They were laughing very, very hard. They were lying on the floor laughing. They were screaming with laughter. I did not know what they were laughing at, but I wanted in. I wanted to be part of that, and I kind of sat around at the edge going, "Hoo hoo!" (Laughter) Now, incidentally, what they were laughing at was a song which people used to sing, which was based around signs in toilets on trains telling you what you could and could not do in toilets on trains. And the thing you have to remember about the English is, of course, we do have an immensely sophisticated sense of humor. (Laughter)

Comentario [G1]: Topic #1

01:03 At the time, though, I didn't understand anything of that. I just cared about the laughter, and actually, as a neuroscientist, I've come to care about it again. And it is a really weird thing to do. What I'm going to do now is just play some examples of real human beings laughing, and I want you think about the sound people make and how odd that can be, and in fact how primitive laughter is as a sound. It's much more like an animal call than it is like speech. So here we've got some laughter for you. The first one is pretty joyful.

Comentario [G2]: Topic #2

01:30(Audio: Laughing)

01:46Now this next guy, I need him to breathe. There's a point in there where I'm just, like, you've got to get some air in there, mate, because he just sounds like he's breathing out.

01:55(Audio: Laughing)

02:04This hasn't been edited; this is him.

02:07(Audio: Laughing) (Laughter)

02:13And finally we have -- this is a human female laughing. And laughter can take us to some pretty odd places in terms of making noises. (Audio: Laughing) She actually says, "Oh my God, what is that?" in French. We're all kind of with her. I have no idea.

02:47Now, to understand laughter, you have to look at a part of the body that psychologists and neuroscientists don't normally spend much time looking at, which is the ribcage, and it doesn't seem terribly exciting, but actually you're all using your ribcage all the time. What you're all doing at the moment with your ribcage, and don't stop doing it, is breathing. So you use the intercostal muscles, the muscles between your ribs, to bring air in and out of your lungs just by expanding and contracting your ribcage, and if I was to put a strap around the outside of your chest called a breath belt, and just look at that movement, you see a rather gentle sinusoidal movement, so that's breathing. You're all doing it. Don't stop. As soon as you start talking, you start using your breathing completely differently. So what I'm doing now is you see something much more like this. In talking, you use very fine movements of the ribcage to squeeze the air out -- and in fact, we're the only animals that can do this. It's why we can talk at all.

Comentario [G3]: Topic #3

03:36 Now, both talking and breathing has a mortal enemy, and that enemy is laughter, because what happens when you laugh is those same muscles start to contract very regularly, and you get this very marked sort of zig-zagging, and that's just squeezing the air out of you. It literally is that basic a way of making a sound. You could be stamping on somebody, it's having the same effect. You're just squeezing air out, and each of those contractions -- Ha! -- gives you a sound. And as the contractions run together, you can get these spasms, and that's when you start getting these -- (Wheezing) -- things happening. I'm brilliant at this. (Laughter)

Comentario [G4]: Topic #4

04:12 Now, in terms of the science of laughter, there isn't very much, but it does turn out that pretty much everything we think we know about laughter is wrong. So it's not at all unusual, for example, to hear people to say humans are the only animals that laugh. Nietzsche thought that humans are the only animals that laugh. In fact, you find laughter throughout the mammals. It's been well-described and well-observed in primates, but you also see it in rats, and wherever you find it -- humans, primates, rats -- you find it associated with things like tickling. That's the same for humans. You find it associated with play, and all mammals play. And wherever you find it, it's associated with interactions. So Robert Provine, who has done a lot of work on this, has pointed out that you are 30 times more likely to laugh if you are with somebody else

Comentario [G5]: Topic #5

than if you're on your own, and where you find most laughter is in social interactions like conversation. So if you ask human beings, "When do you laugh?" they'll talk about comedy and they'll talk about humor and they'll talk about jokes. If you look at when they laugh, they're laughing with their friends. And when we laugh with people, we're hardly ever actually laughing at jokes. You are laughing to show people that you understand them, that you agree with them, that you're part of the same group as them. You're laughing to show that you like them. You might even love them.You're doing all that at the same time as talking to them, and the laughter is doing a lot of that emotional work for you. Something that Robert Provine has pointed out, as you can see here, and the reason why we were laughing when we heard those funny laughs at the start, and why I was laughing when I found my parents laughing, is that it's an enormously behaviorally contagious effect. You can catch laughter from somebody else, and you are more likely to catch laughter off somebody else if you know them. So it's still modulated by this social context. You have to put humor to one side and think about the social meaning of laughter because that's where its origins lie.

06:04Now, something I've got very interested in is different kinds of laughter, and we have some neurobiological evidence about how human beings vocalize that suggests there might be two kinds of laughs that we have. So it seems possible that the neurobiology for helpless, involuntary laughter, like my parents lying on the floor screaming about a silly song, might have a different basis to it than some of that more polite social laughter that you encounter, which isn't horrible laughter, but it's behavior somebody is doing as part of their communicative act to you, part of their interaction with you; they are choosing to do this. In our evolution, we have developed two different ways of vocalizing. Involuntary vocalizations are part of an older system than the more voluntary vocalizations like the speech I'm doing now. So we might imagine that laughter might actually have two different roots.

06:52 So I've been looking at this in more detail. To do this, we've had to make recordings of people laughing, and we've had to do whatever it takes to make people laugh, and we got those same people to produce more posed, social laughter. So imagine your friend told a joke, and you're laughing because you like your friend, but not really because the joke's all that. So I'm going to play you a couple of those. I want you to tell me if you think this laughter is real laughter, or if you think it's posed. So is this involuntary laughter or more voluntary laughter?

07:18(Audio: Laughing)

**Comentario [G6]:** Question #1

**Comentario [G7]:** Question #2

**Comentario [G8]:** Question #3

07:23What does that sound like to you? Audience: Posed. Sophie Scott: Posed? Posed. How about this one?

07:28(Audio: Laughing)

07:33(Laughter)

07:34I'm the best.

07:36(Laughter) (Applause)

07:38 Not really. No, that was helpless laughter, and in fact, to record that, all they had to do was record me watching one of my friends listening to something I knew she wanted to laugh at, and I just started doing this.

07:51What you find is that people are good at telling the difference between real and posed laughter. They seem to be different things to us. Interestingly, you see something quite similar with chimpanzees. Chimpanzees laugh differently if they're being tickled than if they're playing with each other, and we might be seeing something like that here, involuntary laughter, tickling laughter, being different from social laughter. They're acoustically very different. The real laughs are longer. They're higher in pitch. When you start laughing hard, you start squeezing air out from your lungs under much higher pressures than you could ever produce voluntarily. For example, I could never pitch my voice that high to sing. Also, you start to get these sort of contractions and weird whistling sounds, all of which mean that real laughter is extremely easy, or feels extremely easy to spot.

Comentario [G9]: Question #4

08:33In contrast, posed laughter, we might think it sounds a bit fake. Actually, it's not, it's actually an important social cue. We use it a lot, we're choosing to laugh in a lot of situations, and it seems to be its own thing. So, for example, you find nasality in posed laughter, that kind of "ha ha ha ha ha" sound that you never get, you could not do, if you were laughing involuntarily. So they do seem to be genuinely these two different sorts of things.

Comentario [G10]: Question #5

08:57 We took it into the scanner to see how brains respond when you hear laughter. And when you do this, this is a really boring experiment. We just played people real and posed laughs. We didn't tell them it was a study on laughter. We put other sounds in there to distract them, and all they're doing is lying listening to sounds. We don't tell them to do anything. Nonetheless, when you hear real laughter and when you hear posed laughter, the brains are responding completely differently, significantly differently. What you see in the regions in blue, which lies in auditory cortex, are the brain areas that respond

Comentario [G11]: Ex 3. a

more to the real laughs, and what seems to be the case, when you hear somebody laughing involuntarily, you hear sounds you would never hear in any other context. It's very unambiguous, and it seems to be associated with greater auditory processing of these novel sounds. In contrast, when you hear somebody laughing in a posed way, what you see are these regions in pink, which are occupying brain areas associated with mentalizing, thinking about what somebody else is thinking. And I think what that means is, even if you're having your brain scanned, which is completely boring and not very interesting,when you hear somebody going, "A ha ha ha ha ha," you're trying to work out why they're laughing. Laughter is always meaningful. You are always trying to understand it in context, even if, as far as you are concerned, at that point in time, it has not necessarily anything to do with you, you still want to know why those people are laughing.

Comentario [G12]: Ex. 3.b

10:13 Now, we've had the opportunity to look at how people hear real and posed laughter across the age range. So this is an online experiment we ran with the Royal Society, and here we just asked people two questions. First of all, they heard some laughs, and they had to say, how real or posed do these laughs sound? The real laughs are shown in red and the posed laughs are shown in blue. What you see is there is a rapid onset. As you get older, you get better and better at spotting real laughter. So six-year-olds are at chance, they can't really hear the difference. By the time you are older, you get better, but interestingly, you do not hit peak performance in this dataset until you are in your late 30s and early 40s. You don't understand laughter fully by the time you hit puberty. You don't understand laughter fully by the time your brain has matured at the end of your teens. You're learning about laughter throughout your entire early adult life.

Comentario [G13]: Ex. 3 c

11:00 If we turn the question around and now say not, what does the laughter sound like in terms of being real or posed, but we say, how much does this laughter make you want to laugh, how contagious is this laughter to you, we see a different profile. And here, the younger you are, the more you want to join in when you hear laughter. Remember me laughing with my parents when I had no idea what was going on. You really can see this. Now everybody, young and old, finds the real laughs more contagious than the posed laughs, but as you get older, it all becomes less contagious to you. Now, either we're all just becoming really grumpy as we get older, or it may mean that as you understand laughter better, and you are getting better at doing that, you need more than just hearing people laugh to want to laugh. You need the social stuff there.

Comentario [G14]: Ex 3.d

11:42 So we've got a very interesting behavior about which a lot of our lay assumptions are incorrect, but I'm coming to see that actually there's even more to laughter than it's an important social emotion we should look at, because it turns out people are phenomenally nuanced in terms of how we use laughter.

There's a really lovely set of studies coming out from Robert Levenson's lab in California, where he's doing a longitudinal study with couples. He gets married couples, men and women, into the lab, and he gives them stressful conversations to have while he wires them up to a polygraph so he can see them becoming stressed. So you've got the two of them in there, and he'll say to the husband, "Tell me something that your wife does that irritates you." And what you see is immediately -- just run that one through your head briefly, you and your partner -- you can imagine everybody gets a bit more stressed as soon as that starts. You can see physically, people become more stressed. What he finds is that the couples who manage that feeling of stress with laughter, positive emotions like laughter, not only immediately become less stressed, they can see them physically feeling better, they're dealing with this unpleasant situation better together, they are also the couples that report high levels of satisfaction in their relationship and they stay together for longer. So in fact, when you look at close relationships, laughter is a phenomenally useful index of how people are regulating their emotions together. We're not just emitting it at each other to show that we like each other, we're making ourselves feel better together.

Comentario [G15]: Ex. 3. e

13:09 Now, I don't think this is going to be limited to romantic relationships. I think this is probably going to be a characteristic of close emotional relationships such as you might have with friends, which explains my next clip, which is of a YouTube video of some young men in the former East Germany on making a video to promote their heavy metal band, and it's extremely macho, and the mood is very serious, and I want you to notice what happens in terms of laughter when things go wrong and how quickly that happens, and how that changes the mood.

Comentario [G16]: Ex. 4. a

13:40He's cold. He's about to get wet. He's got swimming trunks on, got a towel. Ice. What might possibly happen? Video starts. Serious mood. And his friends are already laughing. They are already laughing, hard. He's not laughing yet. (Laughter) He's starting to go now. And now they're all off. (Laughter)They're on the floor. (Laughter)

14:54 The thing I really like about that is it's all very serious until he jumps onto the ice, and as soon as he doesn't go through the ice, but also there isn't blood and bone everywhere, his friends start laughing. And imagine if that had played him out with him standing there going, "No seriously, Heinrich, I think this is broken," we wouldn't enjoy watching that. That would be stressful. Or if he was running around with a visibly broken leg laughing, and his friends are going, "Heinrich, I think we need to go to the hospital now," that also wouldn't be funny. The fact that the laughter works, it gets him from a painful, embarrassing, difficult situation, into a funny situation, into what we're actually enjoying

there, and I think that's a really interesting use, and it's actually happening all the time.

15:34For example, I can remember something like this happening at my father's funeral. We weren't jumping around on the ice in our underpants. We're not Canadian. (Laughter) (Applause) These events are always difficult, I had a relative who was being a bit difficult, my mum was not in a good place, and I can remember finding myself just before the whole thing started telling this story about something that happened in a 1970s sitcom, and I just thought at the time, I don't know why I'm doing this, and what I realized I was doing was I was coming up with something from somewhere I could use to make her laugh together with me. It was a very basic reaction to find some reason we can do this. We can laugh together. We're going to get through this. We're going to be okay.

Comentario [G17]: Ex 4. b

16:18 And in fact, all of us are doing this all the time. You do it so often, you don't even notice it. Everybody underestimates how often they laugh, and you're doing something, when you laugh with people, that's actually letting you access a really ancient evolutionary system that mammals have evolved to make and maintain social bonds, and clearly to regulate emotions, to make ourselves feel better. It's not something specific to humans -- it's a really ancient behavior which really helps us regulate how we feel and makes us feel better.

16:47In other words, when it comes to laughter, you and me, baby, ain't nothing but mammals. (Laughter)

Comentario [G18]: Ex. 4. c

16:53Thank you.