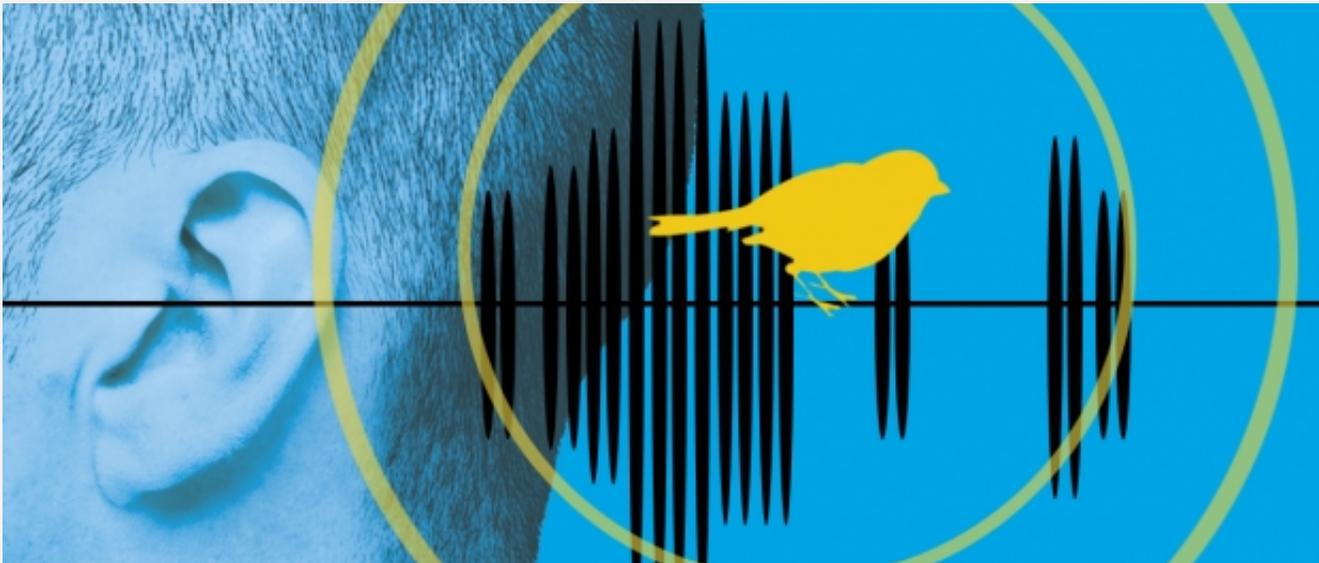


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DOES TONE SPEAK LOUDER THAN WORDS?

As Duke researchers listen to sound and tone, they're showing there's more to what we say than what we say.

Scott Huler

February 18, 2014

By the time you finish reading this story you will have learned the following things: Men can hear fertility status in a woman's voice—and they like it; a big, deep “me Tarzan” voice seems to help not just men but women succeed in politics and business; the pitch and tone of a CEO's voice in a conference call may give you information about stock performance; women have it even tougher than you knew; and there may be evolutionary value in this whole “vocal fry” trend (think Kardashian end-of-sentence croak; for a less cringe-inducing example, actress Zooey Deschanel).

That's a lot to cover. So the natural place to start is to ask whether animals lie.

Which actually leads to all those other things; plus, it's an easy question to answer, says [Duke research biologist Rindy Anderson](#). If an animal signals something, you can pretty much take it to the bank:

“They're mostly honest in their communication.” Anderson focuses her interest on birds, but the honesty applies “across taxonomic groups.” Anderson does her research in the biology department's Nowicki Lab, which studies animal communication and sexual selection, and she focuses on the evolutionary ecology of behavior, especially on how animals talk. “That's what Susan and I do,” she says, of herself and research associate Susan Peters. “We study animal communication, and we think about birds and how

they're using their vocalizations to communicate information to each other.”

She does things like take realistic taxonomic sparrows prepared by taxidermists, stick them in the territory of a live sparrow, slip a tiny speaker beneath them, and have them appear to send out challenge calls. “We have now created an intruder sparrow. We go out in the field, see how it all works out, go back to the lab, and analyze the songs.” What they've learned is that if a real bird responds with an aggression call, that bird follows up with aggression. Birds don't kid around.

Which is good to know but not terribly surprising. Owners of mopey-faced dogs that have been at the fried chicken know this: Animals keep few secrets. Yet scientists argued about this topic quite a bit in the second half of the twentieth century, working hard to figure out what kind of information animals were sharing in their vocalizations.

Anderson and her colleagues— Peters and [associate scholar Casey Klofstad](#) (who happens to be Anderson's husband)—explain the history at the table in their lab common room. “The earliest ethologists, back in the 1940s and '50s, who first started studying animal behavior believed that animal signals must be honest because that's for the good of the species,” Anderson says. Honest communication benefited both sender and receiver, which thus benefited the species: a “group selectionist” argument. Ah, but not so fast—the next group of ethologists noted that since natural selection takes place at the individual, not the group, level, communication ought to be viewed “as an arms race, pitting senders versus receivers.” I'm a bird who sends, say, a threatening message with no intention of following up, trying to scare you; you're the receiver, and your job is then to ferret out whether I mean it or I'm just chirping through my hat.

The problem with that, which the next generation of ethologists noted through the use of mathematical models, is that statistically, if, on average, signals are not honest, then the species doesn't benefit as a whole, in which case what's the point of going to the trouble to communicate at all? Signaling systems take energy, and they simply wouldn't keep developing if they weren't doing anybody any good. Anderson smiles. “Well, we have trillions of signaling systems,” she says. “So some mechanism of natural selection must be enforcing honesty.” And she takes pains to point out, “It's not that animals want to be honest. It's that natural selection forces them to be honest.” Peters notes that birds get more from their communication than just, “Hey! I'm walking here!” “It's a subtle

thing,” she says. During its early years, when a bird is learning its song, it’s also developing in many other areas. If a male’s song isn’t particularly well developed, Peters goes on, “that can indicate to the female his early developmental history,” and she will choose other mates who started out better. “In that way it’s also an honest signal.” More honest, perhaps, than the bird would like, but honest nonetheless. Information like that—not the mating call but the quality of the mating call—raises other questions. Besides the straightforward signal, what other messages do communications carry?

“There was a paper a few years ago showing that women’s voices rise in pitch slightly when they’re ovulating,” Anderson says. “And that men can detect it.” In experimental situations, where men were asked to rate recordings of women’s voices for attractiveness, “they always rated the voices of women who were ovulating more highly.

“That is very strong evidence that we as humans are cued in to these subtle aspects of voice.”

That would get anybody thinking, but imagine what it does for a biologist who thinks about honest animals and who happens to be married to someone who studies a species somewhat less noted for its honesty. “Well,” Anderson recalls discussing with her husband, “what other domains of our lives could this be functioning in?”

Hard to dispute, at least in the lab. What they could test in the lab, though, was that seeming preference for deeper voices in a particular situation. “That led us to say, ‘Hey, let’s combine her interest in vocal signaling and my interest in political participation and replicate this type of study,’” Klofstad says. So he, Anderson, and Peters recorded men and women saying, “I urge you to vote for me this November,” a political but partisan-neutral statement. They used a computer program to make two altered copies of the statement: one with the pitch raised and one with the pitch lowered. They then played the paired recordings to 182 subjects at Duke and the University of Miami (where Klofstad works when he’s not visiting Duke) and asked them to choose whom they’d vote for.

Both men and women preferred the deeper-voiced “candidates.” In a second study, to

see if they could get people to choose the higher-pitched voices, they presented the candidates as running not for some unnamed office but for president of the Parent Teacher Association or school board, positions demographically associated with traits that are considered feminine, like caring and compassion. Any change in preference?

“We still like low,” Klofstad says. There’s a certain mishmash regarding how women judge men for roles culturally associated with women—perhaps women are listening for something different than standard male domination?—yet women judging women and men judging everybody still preferred the lower-pitched voices. The data appeared in 2012 in the Proceedings of the Royal Society B.

This is a SoundCloud player interface for the track "Scott Huler- Baseline Voice" by DukeAlumniAssociation. On the left, there is a square image showing four black silhouettes of birds. The player includes a play button, the track title, the artist name, and the SoundCloud logo. A blue waveform visualization is centered below the title. On the right, there are icons for liking and sharing, and a progress bar showing 0:09 out of 0:10. A small "4" is visible in the bottom right corner.

This is a SoundCloud player interface for the track "Scott Huler -Low Voice" by DukeAlumniAssociation. It features a play button, track title, artist name, and SoundCloud logo. Below the player, there is a section titled "Play another track" with two recommendations. The first recommendation is "Moneyball Hoops by Darbi Griffith" by DukeAlumniAssociation, with a small album cover and a play button and the number "1". The second recommendation is "Scott Huler-High Voice" by DukeAlumniAssociation, with a square image of four black silhouettes of birds and a play button and the number "7".

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So, okay, your big, manly voice can help you get elected; makes sense, right? George H.W. Bush defeated Michael Dukakis, Bill Clinton defeated Bush, George W. Bush defeated Al Gore. It’s a system! Except, of course not: For one thing, Barack Obama has a reedier, higher voice than Mitt Romney, and Bob Dole’s gravelly baritone made

Clinton sound like Alvin of the Chipmunks. All three researchers made sure to clarify: They're in no way saying a deep voice is all you need to succeed in politics or a deep voice is necessarily a difference maker. But they have found that in political choices, as in other ways, people perceive more information than the message carried by the meanings of the words, and that information has effects.

Cool. And electing leaders seems, you know, important and all. But being honest, what people really want from research is information about how to make money, right? Which brings up the nascent field of biological economics, where Fuqua School professors [Bill Mayew](#) and [Mohan Venkatachalam](#) in 2013 published data that reached a somewhat similar conclusion.

In Mayew's sunlit office in the Fuqua School, the two explain their research. The first thing Mayew and Venkatachalam studied, starting in the late 2000s, was whether corporate executives were sharing information beyond the content of their words during the ubiquitous quarterly conference calls that stockbrokers and business and market analysts listen to. "I spend a lot of time listening to conference calls," Mayew says. He naturally got to wondering whether he could glean something more: "Is there something incremental you can learn from voice?" These conference calls are posted online on corporate sites, so the subject voice files were there for the taking. "We're going back in time," he says, "looking at archival data, data that's already happened." That is, he and Venkatachalam don't do their work in the lab—they gather information on observable reality and then try to correlate it with factors they're studying.

In this case, emotion. They used commercial vocal-emotion-analysis software, which takes baseline measures of individual speech patterns and then notes when a speaker strays far away from the norm. Individual programs measure things differently—and of course keep their methods secret—but they all measure things like volume, speed, and pitch. "There's a feature called jitter," says Venkatachalam, "a feature called shimmer." The programs process a long speech from a conference call; figure out how often the speaker's voice is louder, softer, more or less jittery, and so on; and compute a score on a continuum indicating the speaker's emotional state.

Because the two know when the call occurred, they were able to look at whether happy-sounding executives correlated with good stock performance and less-cheerful

ones with poorer performance. “And the answer was yes,” says Venkatachalam. “Emotions are correlated with returns, processed implicitly by the stock market.” They published their research in 2012 in the *Journal of Finance*. The two are quick to point out that they are not experimentalists: They measure correlation and not causation. They simply note: Happy-sounding executives, on average, correlate with well-performing stock. But still—can they say that voice does matter?



“It’s not even as strong a statement as voice does matter,” Mayew says. “It’s consistent with voice mattering,” but we like to presume the causation, he says, “because it makes sense. I go home and ask my wife how she’s doing and she says fine, but I know she’s not fine even though she says fine.” That gutlevel human awareness makes us want to believe in a causation. They, too, think it’s there, but they don’t think they’ve proven it.

Next they’re interested in more closely correlating statements and market performance. Analysts listen to those conference calls and make trades in real time, so the researchers would like to time-stamp particular emotional signals and see how they affect stock price in the next moments.

Once you start gathering all this big data on the voices of corporate executives, though,

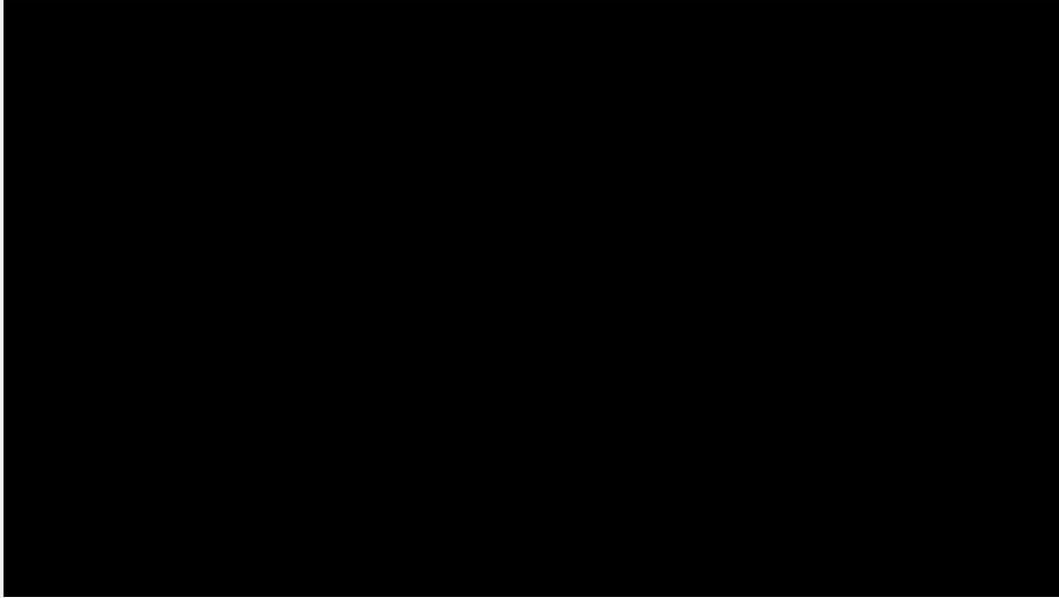
you can do plenty of other cool things. “We saw Rindy and Casey’s work,” says Mayew, referring to the work on voting and voice pitch, “and we saw we can measure the innate portion” of voices. So they analyzed the pitch of conference-call voice samples of 792 CEOs from the Standard & Poor’s 1500. They cross-referenced those with data on company size, assets managed, CEO compensation, and length of time the CEO had been with the firm.

Yep—CEOs with deeper voices manage larger companies and more assets, make more money, and last longer. Though the results, published (along with Christopher Parsons of the University of California at San Diego) in *Evolution and Human Behavior* in 2013, also expressly urged no leaps to conclusions: A deep voice, “a trait known to indicate success in biological competition is also associated with success in the economic labor market of CEOs,” to be sure, but “voice pitch is likely not the only biological trait that matters as it goes without saying that there are likely a myriad of characteristics that influence how the CEO is perceived.”

Just the same, given the seeming power of a lower voice, it’s hard not to wonder whether trying to sound like you have a deep voice might not be the key to success, both in business and in evolution. Which might be one of the explanations behind what is called vocal fry—the creaky-voiced affectation currently demonstrated by many young women, usually at the end of sentences when the voice lowers and drags like an empty soup can tied behind a car.

“If a deep voice is such an important thing,” Mayew asks, “why doesn’t everybody do it? Fake it until you can make it?” Good question. So Mayew and Venkatachalam have joined with Anderson and Klofstad to study whether vocal fry is adaptive, or perhaps ironic, or...what. Anecdotal evidence yields cases of people both hating vocal fry and perceiving it as adaptive. Anyway, they’re putting it in the lab but using a business scenario. They give participants a phrase - “Thank you for considering me for this opportunity”—to record twice, once regular and once with vocal fry. Subjects are played the recordings and asked which candidate they’d more likely hire. You’ll have to wait for the results. The combination of lab and real world is an example of good science—the lab provides greater control, but as Venkatachalam says, “we’re able to add what we call external validity.” Lab subjects may prefer one kind of speaking, but seeing its preference in the real world gives a different kind of evidence. It also,

though, gives a rounder appreciation for the complexities of the topic. “That’s the true beauty of cross-disciplinary work,” Mayew says. “You really need both to figure out what matters in life.” He’s got a deep voice. Who’s going to argue?



[voice of a leader final](#) from Scott Huler on Vimeo.

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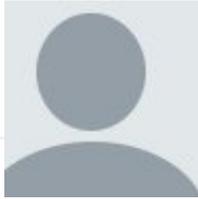
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