

The Human Voice

BY JIM SULLIVAN



1 For decades, scientists thought a key element of generating voice was the Bernoulli effect, the same change in relative air pressure that allows airplanes to fly and curveballs to befuddle batters. **2** We now know, however, that voice generation is far more complex. Muscles in the vocal folds provide resistance to air in the lungs. As air is exhaled, it pushes between the folds, which open and close rapidly. Air above the folds is alternately compressed and decompressed, creating sound waves.

3 Researchers at the National Center for Voice and Speech theorize that singing is a more right-hemisphere brain function, while speaking is more left-hemisphere dominant.

4 This dichotomy is why some victims of stroke, unable to speak, can still sing. **5** It's also why some famous singers — including Carly Simon, Mel Tillis and Bill Withers — ply their trade with no problem, but sometimes stutter in conversation. **6** Conversational voice is about 60 decibels, but the loudest

human voice, according to *Guinness World Records*, belongs to teaching assistant Jill Drake of Kent, England. Her scream of 129 dBA was equivalent to noise levels at an AC/DC concert, and about 30 dB louder than a jackhammer. **7** The most complex language to voice is !Xóó, spoken mostly in Botswana. It has 112 distinct sounds. English, by comparison, has about 40. **8** Tuvan, as one might expect, is where Tuvan throat singing, or *Khöömei*, originated. The nomadic people of this small corner of Siberia prize multiple pitches in their music rather than single, clear tones. **9** Some throat singers can produce four tones simultaneously. **10** To understand throat singing technique, imagine bagpipes. Just as pipers first produce a low drone and then layer on additional tones, throat singers start with a droned vocalization and then manipulate their vocal folds, root of the tongue or epiglottis — a flap of cartilage at the base of the tongue — to add additional notes.

11 An entirely different sort of vocal manipulation,

yodeling, is a fast alternation between low notes and falsetto. **12** Whether throat singing, yodeling or just plain speaking, there are more baritones among males than either basses or tenors. Similarly, the middle range — mezzo-soprano — is the most common of female vocals. **13** All children are considered trebles, with the same approximate range as a soprano. It isn't until puberty that both girls and boys experience a lengthening and thickening of vocal folds that change their vocal range, with males' folds becoming considerably longer and thicker than females'. **14** Well, usually, anyway. Castrati were male singers castrated before puberty. Without the normal adult male testosterone levels, they remained natural trebles. **15** Castrati were often highly paid, and in less enlightened times, some parents castrated their sons in hopes of cashing in. **16** The only surviving recordings of a castrato performing solo are from 1904 by Alessandro Moreschi. He hits notes common to a soprano with no apparent strain. **17** On the other end of the musical spectrum, the lowest note ever sung was a G (-7) (0.189 hertz) by singer Tim Storms. Eight octaves below the lowest G on a piano, the note is actually outside of human hearing. It was captured using a low-frequency microphone and then verified via precision sound analysis. **18** Storms also holds the Guinness record for widest range, a full 10 octaves — about twice that of Mariah Carey and more than three times the average singer's range of just three octaves. **19** In 1860, the phonautograph, invented by Édouard-Léon Scott de Martinville, captured the oldest recognizable recording of the human voice. Like Thomas Edison's later invention, the phonograph, Scott's phonautograph converted sound waves into lines traced onto a turning cylinder. **20** Unlike Edison, however, Scott never intended to play back his recordings: His goal was a visual representation of voice. Only with recently developed software could modern researchers hear his recording of a singer performing *Au Clair de la Lune*. **D**

In addition to his career as a writer, **Jim Sullivan** has done voiceover work for more than 20 years.



Hear more at DiscoverMagazine.com/HumanVoice

The most complex language to voice is !Xóó, spoken mostly in Botswana. It has 112 distinct sounds.

DISCOVER (ISSN 0274-7529, USPS# 555-190) is published monthly, except for combined issues in January/February and July/August. Vol. 36, no. 7. Published by Kalmbach Publishing Co., 21027 Crossroads Circle, P.O. Box 1612, Waukesha, WI 53187-1612. Periodical postage paid at Waukesha, WI, and at additional mailing offices. POSTMASTER: Send address changes to DISCOVER, P.O. Box 37807, Boone, IA 50037. Canada Publication Agreement # 40010760, return all undeliverable Canadian addresses to P.O. Box 875, STN A Windsor, ON, N9A 6P2. Back issues available. All rights reserved. Nothing herein contained may be reproduced without written permission of Kalmbach Publishing Co., 21027 Crossroads Circle, P.O. Box 1612, Waukesha, WI 53187-1612. Printed in the U.S.A.