The science of charismatic voices

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When a right-wing Italian politician named Umberto Bossi suffered a severe stroke in 2004, his speech became permanently impaired. Strangely, this change impacted Bossi's perception among his party's followers—from appearing authoritarian to benevolent.

Now researchers at the University of California, Los Angeles think they know why. Probing the vocal presence of charisma across cultural divides, the scientists found speakers with a wide range of frequency variation in their voices were more likely to be perceived as dominant. They also found that speakers with a low fundamental rate of vocal fold vibration, called fundamental frequency or F0, are perceived as more dominant than speakers with a high fundamental frequency.

Charismatic voices are made up of two fundamental components, said Rosario Signorello: one biological and one based on language and culture. Signorello is a postdoctoral scholar at UCLA's Bureau of Glottal Affairs who will be speaking on Thursday about his current research at the 168th Meeting of the Acoustical Society of America (ASA), which will be held October 27-31, 2014, at the Indianapolis Marriott Downtown Hotel.

The biological component of charismatic voice is innate, Signorello said, and consists of a speaker's manipulation of changes in fundamental frequency to be recognized as a group leader. By using a process of speech synthesis called 'delexicalization,' it is possible to remove the subjective influence of a speech's content, allowing a researcher to study the biological component in a controlled fashion.

"You get rid of the words and try to keep the acoustic parameters," Signorello said. "You keep the F0 frequency, the intensity and the duration, with no alteration to the other spectral and acoustic parameters." The F0, or fundamental frequency, is the rate of vocal fold vibration as measured in Hertz. These parameters can then be individually modified to gauge, which has the largest impact on a listener's willingness to agree with a speaker or charismatic leader.

Signorello became interested in the role of voice quality in charismatic speech while working on his thesis. To better understand the impact of vocal frequencies on charismatic perception, he turned his eyes on the case of Umberto Bossi.

"I collected speeches of him before and after the stroke," Signorello said, "and I discovered that before the accident, he was perceived as an authoritarian leader, because his voice was characterized by low average of fundamental frequency, normal modulation of the pitch contour, a wide pitch range, a lot of perturbation in voice and a lot of creakiness and harshness." Signorello believes that the stroke caused a hemiparesis, or asymmetrical muscle weakness, of Bossi's vocal fold – thus impacting his speech capabilities.

"The stroke caused him to have a very flat pitch contour, so even if he had the harshness, even if he had the creakiness – his pitch contour was very flat." Pitch contour is the entire range of modulation of the fundamental frequency during a given window. "I submitted his voice to the listeners and he was perceived as a benevolent and competent leader, which is very different from the authoritarian perception. In that case, the pitch contour played a very important role."

Signorello's current research involves a cross-cultural comparison of charismatic voice perception in Italian, French and Portuguese politicians – Luigi de Magistris, François Hollande and Luiz Inácio Lula

da Silva, respectively. By analyzing speeches from these politicians through delexicalization and native-speaker assessment, Signorello asserts that a listener's perception of a speaker as dominant and threatening can be attributed to their use of an average low F0 voice and wide pitch range. Conversely, their use of an average higher F0 and narrow pitch range conveys sincere and reassuring leadership. While these perceptions have been exhibited as existing cross-culturally, however, a listener's preference for a leadership type remains also dictated by specific cultural norms.

"The Italians seem to need a low pitched voice, and the French a high pitched one, because of cultural reasons," Signorello said. "The Italians seem to want a more dominant leader, and the French a more competent leader."

Future research for Signorello and his colleagues involves studying the voice of leadership in non-human primates.

"What we want to do is understand how the use of the F0 helps the nonhuman primate individuals to emerge and be recognized by the group and understand how these individuals use their voice behavior to create different patterns and convey leadership," Signorello said.

"The hypothesis is that the biological function of charismatic voice is also cross-species."

More information: Presentation #4pSC14, "The biological function of fundamental frequency in leaders' charismatic voices," by Rosario Signorello will be presented during a poster session on Thursday, October 30, 2014, from 1:00 to 4:00 PM in Marriott 5. The abstract can be found by searching for the presentation number here: https://asa2014fall.abstractcentral.com/planner.jsp