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FEATURE ARTICLE

How Voice Pitch Influences Our Choice of Leaders

Candidates' vocal characteristics influence voters' attitudes toward them.

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Vocal signals among animals can carry different types of messages simultaneously. The croaking of a frog or the screech of a monkey conveys information about the animal making the sounds: its motivation, its ability to defend resources, its health, and even its genetic quality. Other animals have evolved to pay attention to this implicit information and adjust their own behavior accordingly, because doing so can increase their own evolutionary fitness. For example, research by two of us (Anderson and Nowicki) shows that in an aggressive encounter between songbirds, the loudness of a bird's song reliably signals the likelihood that the bird will physically attack its opponent. Both the signaler and the recipient stand to benefit from the information exchange, because both can avoid a potentially costly fight if they are not equally motivated or able to defend whatever is being contested, such as a territory, a prospective mate, or a source of food.

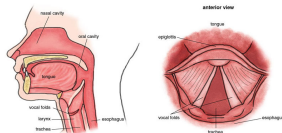

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Spoken language is unique to humans, and it is far more complex than the communication systems of animals such as songbirds, but we too are influenced by nonverbal aspects of speech. The idea that listeners are affected not just by the words we say, but also by how we say them, should come as no surprise: We all can think of instances in which the same words said with different inflections can mean very different things. What is more surprising is that subtle characteristics of speech—features of which we are hardly aware—can have a significant impact on our perceptions of a person, even in contexts where we might think these perceptions should be irrelevant. Our research explores one such context that is particularly topical in this 2016 election season: how vocal traits, specifically voice pitch, can influence our selection of leaders.

What Determines Voice Pitch?

Voice pitch, the perceived "highness" or "lowness" of a voice, fundamentally is an expression of physiology, not psychology. All sounds are the result of minute fluctuations in air pressure; speech sounds in particular represent patterned fluctuations that are created when we force air through the vocal tract. The flow of air is modified by the vibration of the vocal folds (or vocal cords) in our larynx (or voice box), as well as by the movement and relative positions of our tongue, jaw, lips, and so forth. The specific pitch of a person's voice reflects the fundamental frequency at which the vocal folds are vibrating and thereby imposing periodic variations in air pressure, measured in hertz, or cycles per second.

As with the strings of a guitar or piano, when vocal folds are longer and thicker, they tend to vibrate more slowly and so produce a lower-pitched voice, whereas shorter and thinner vocal folds vibrate more quickly and thus produce a higher-pitched voice. The size of the vocal folds is largely determined by the size of the larynx, and their thickness is further influenced by the action of hormones such as testosterone. The larger the larynx, the longer and thicker the vocal folds and the lower the pitch of the voice. Typical male voices range in pitch from 85 hertz to 180 hertz; typical female voices, from 165 hertz to 255 hertz. The considerable difference in voice pitch between men and women reflects not only the average difference in body size between the sexes, but also the fact that the size of the larynx is a secondary sexual characteristic partly controlled by testosterone; this is why the male larynx—commonly referred to as the "Adam's apple"—enlarges disproportionately with the onset of puberty.


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Although voice pitch is mostly determined by throat anatomy, a speaker can modulate the pitch of his or her voice. A well-known historical example, highlighted in the 2011 motion picture *The Iron Lady*, is the modulation in pitch of Margaret Thatcher's voice that resulted from the vocal training she underwent before she became prime minister of the United Kingdom. Her biographer, Charles Moore, has suggested that learning how to modulate the pitch of her voice may have helped Thatcher accelerate her political career. This kind of training can modify voice pitch only so far, however, within the constraints of the speaker's anatomy and physiology. To take an example from a different realm of life, even with extensive vocal training some low-voiced women cannot develop the ability to sing in the soprano musical range, and not all men have the physical ability to sing a bass part. A person can adjust the pitch of his or her speaking voice to some degree, but in most cases the change is minor in comparison with the innate differences of pitch among individuals.

Voice Pitch Can Influence Our Impressions of Speakers

Using recorded voices that have been manipulated to sound higher or lower, psychologists and linguists have demonstrated that a person's voice pitch affects how others perceive her or him. Most of this research is based on experiments in which participants are presented with a *forced-choice* task, being asked to select which manipulated voice—the higher or the lower one—is more attractive, stronger, younger, or more salient by some other criterion, depending on the question being studied. A benefit of this research design is that the subject is making his or her judgment based solely on voice pitch; the two recordings that the subject is judging are otherwise identical, spoken by the same person and differing only in pitch.

Experiments of this kind reveal a number of important ways in which voice pitch influences how we perceive and interact with one another. For example, males with lower-pitched voices tend to be perceived as more attractive, physically stronger, and more "dominant" (a term offered by the experimenter to mean, loosely, "respected," "commanding," "more likely to be followed," or something along those lines). For females, the standard is dichotomous: Women with higher-pitched voices tend to be considered more attractive, whereas those with lower-pitched voices are perceived as more dominant.

It's possible that these perceptions may have evolutionary underpinnings. For example, research by Gregory Bryant and Martie Haselton at the University of California, Los Angeles, shows that hormonal changes cause the pitch of a woman's voice to rise during the point in her menstrual cycle when she is most likely to conceive. In an evolutionary sense, then, women with higher voices should be perceived as more attractive, because a high voice is associated with peak fertility on average. By contrast, lower voices in men tend to correlate with higher levels of circulating testosterone in the blood stream, which in turn correlates on average with increased physical and social aggressiveness, as shown in studies by John Archer at the University of Central Lancashire and David Puts at Pennsylvania State University, among others. One might well suppose that at some early point in human evolution, females perceived these qualities positively because they indicated health, good genetics, and the physical ability to defend a mate and offspring from threats.

Research subjects, both male and female, preferred a lower-pitched voice, whether the candidate was female or male.

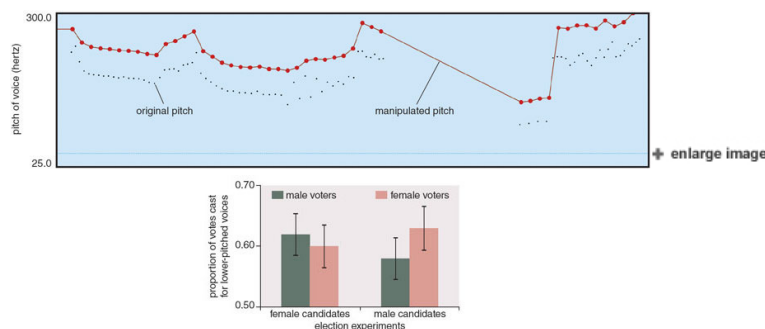
The unmistakable influence of voice pitch on our perception of a speaker suggests that this trait may play a role not only in social interactions but also in how we perceive and select our political leaders. The first study to test this proposition, conducted by Cara Tigue and her colleagues at McMaster University, consisted of two experiments. In the first, recordings of spoken remarks by nine United States presidents were manipulated digitally to yield higher- and lower-pitched versions of the original. A total of 125 research subjects (61 women and 64 men) were asked to “vote” for the higher- or lower-pitched version of each of the nine pairs. On average, the subjects voted for the lower-pitched voices 67 percent of the time. In a second experiment, Tigue and colleagues manipulated six novel male voices rather than those of known leaders. The 40 subjects (20 women and 20 men) were again presented with pairs of voices and asked to vote for either the higher- or lower-pitched voice of each pair. As in the presidential voices experiment, the subjects preferred candidates with lower-pitched voices; this time the candidates with lower voices were selected 69 percent of the time.

Our own interest in the influence of voice pitch on the selection of leaders represents the meeting point of two lines of investigation that might otherwise seem to have nothing in common: vocal signaling, particularly in birds (Anderson and Nowicki), and political behavior (Klofstad). At the same time that Tigue and colleagues were conducting their study, we carried out a similar forced-choice experiment. We first recorded a number of men and women saying, “I urge you to vote for me this November,” a nonpartisan but politically relevant phrase. We then altered those voices digitally, both to slightly raise and to slightly lower the pitch of each. The resulting gap between the higher- and lower-pitched version of each manipulated voice is equivalent to approximately 40 hertz (on a piano, roughly the difference between A3 and C4, or middle C).



female-high / female-low / male-high / male-low

Not only did subjects hear only a nonpartisan statement asking for support, but they also received no information as to the leadership role being sought. More specifically, to rule out the possibility that the influence of voice pitch might differ depending on the political office at stake, we did not tell the participants whether they were being asked to vote for a member of Congress, the president of a parent teacher organization (PTO), or any other particular position. We presented subjects with multiple pairs of manipulated voices (10 male and 17 female) and asked which voice they would choose from each pair. When we calculated the proportion of votes cast by each subject for the lower voice of each pair, we found that both male and female voters preferred a lower-pitched voice, whether the candidate was male or female; the proportion of votes cast for candidates with lower voices was roughly 60 percent regardless of the sex of either the candidate or the voter.



The consistency of our results with those of Tigue’s study led us to ask, Why do voters prefer leaders with lower-pitched voices? To begin to answer this question, we conducted another experiment, in which we again asked participants to choose between candidates with lower- or higher-pitched voices, but this time we simultaneously asked which voice of each pair they perceived as sounding stronger, more competent, and older.

It makes sense to ask about perceptions of strength and competence—these are undoubtedly desirable qualities in a leader—but the question about age may need more explanation. We reasoned that one logical reason for the finding that voters prefer leaders with lower voices is that these candidates are perceived as older, and thus wiser and more experienced. There may be some merit to this notion, given that other research has shown that age can be predicted accurately based on various characteristics of a person’s voice, including pitch. Research conducted across 26 countries on six continents—including Argentina, Australia, France, Japan, Uganda, and the United States—by Corinna Löckenhoff of Cornell University and her colleagues shows that older individuals generally are perceived as wiser than younger individuals. Moreover, research by Joann M. Montepare of Lasell College in Massachusetts and her colleagues shows that speakers with older-sounding voices are perceived as wiser than those with younger-sounding voices. Consequently, we wondered whether the influence of voice pitch on voters’ preferences could be influenced by perceptions of age.

During our follow-up experiment, in which we asked subjects to choose among candidates as well as to rate them, on the basis of their voices, according to their apparent competence, strength, and age, we found that each of these three perceptions can explain some of the preference for candidates with lower voices. However, contrary to our prediction that the preference for lower-voiced leaders is driven primarily by a perception that they are older, our results suggested that we prefer leaders with lower voices largely because we see them as stronger and more competent; only secondarily do we prefer to vote for them because we perceive them as older and more experienced. Our perceptual biases for vocal behavior, then, appear to have less to do with attributes such as wisdom or experience than we might consciously hope for in a political leader.

Applying Research to Real Elections

The growing number of experimental studies on the influence of voice pitch on the selection of leaders leads to the obvious question, Are voters in real elections actually influenced by the pitch of a candidate’s voice? We now have data suggesting that they are. A study conducted by one of us (Klofstad) of all 435 U.S. House elections in 2012 showed that voice pitch correlated with electoral outcomes: Both male and female candidates with lower voices were significantly more likely to win. For example, candidates who had a lower voice than their opponents were 13 percent more likely to win office and garnered an average of 4 percent more of the vote share. These results held up even when a multitude of alternative explanations for electoral outcomes were accounted for in the analysis: campaign spending, incumbency, the candidate’s sex, and the ideological preferences of voters in the candidate’s congressional district. It is important to note that these data (unlike data from our other studies) are observational, not experimental, and thus we cannot say that candidate voice pitch “caused” a House candidate to win or lose in 2012. At the very least, however, these results comport with our experimental findings by showing a strong and statistically significant correlation between having a lower voice and electoral success.

On further analysis, results from the 2012 U.S. House elections revealed some interesting wrinkles in the overall pattern of preference for candidates with lower-pitched voices. First, the preference is not consistent once the sex of the candidates running against each other is taken into account. We found that when the pitch of a male candidate’s voice was 40 hertz lower than that of his male opponent’s (the gap we used in the forced-choice studies described earlier), that difference was associated with a 13.9-percent higher likelihood of that candidate’s defeating a male opponent. When a male candidate was running against a female candidate, however, having a voice 40 hertz lower in pitch *decreased* his likelihood of winning by 25.8 percentage points. In other words, our observational data suggest that the advantage given to lower-pitched male voices in a male-male contest appears to work in the opposite

direction in a male-female contest.

The explanation for this double-edged effect is not yet clear. Could it be that male candidates with lower voices are perceived as too aggressive when paired against a female opponent? Testing such a hypothesis will require experimental studies in which male and female candidates with differently pitched voices compete against each other, and in which the research participants are asked not only to choose one candidate but also to report their perception of each candidate's aggressiveness. We hope to conduct such a test in the near future.

A second complication in the pattern of preference for lower-pitched voices has to do with the type of leadership position being sought. Apropos of the sex differences described above, two of us (Anderson and Klofstad) hypothesized that voters' preference would shift to higher-pitched (that is, more feminine) voices if the race in question was for a leadership position that is typically held by women. To test this idea, we replicated our forced-choice experiment with higher-pitched and lower-pitched voices of candidates, but this time we asked one set of participants to vote for a member of the school board (a municipal-level governing body that oversees schools) and another set to vote for president of the PTO (a school-level voluntary service organization). Both positions are concerned with the welfare of children; in the United States, where our study was conducted, women are more likely than men to hold both types of positions.

In contrast to our prediction that higher-pitched voices would win out in elections for more conventionally feminine leadership roles, we found that both men and women voters preferred female candidates with deeper voices for both the school board and the PTO presidency. When both of the candidates were men, however, the participants in our experiment reacted differently: Men preferred men with lower-pitched voices for both positions, but women did not discriminate between higher- and lower-pitched male voices when voting for either leadership position. These results suggest that the influence of voice pitch on perceptions of leadership capacity is largely consistent across different domains of leadership; at the same time, the results allow for the possibility that when it comes to traditionally feminine leadership roles, women may have more ambivalent attitudes about male voices than men do.

In this same vein, more detailed analysis of our previous forced-choice experiments revealed that the sex of the candidate and the sex of the voter both matter. The general pattern is that voters prefer leaders with lower voices regardless of the sex of the candidate or that of the voter. However, this bias is stronger among female voters, particularly when they are judging female candidates. That is, women have a particularly strong preference for deeper-voiced—and thus, presumably, stronger and more dominant-sounding—female leaders. An alternative interpretation of this result rests on the finding from numerous studies—including those by Joan Y. Chiao, director of the International Cultural Neuroscience Consortium, and her colleagues, and by Kyle Mattes of Florida International University and Caitlin Milazzo of the University of Nottingham—that candidate attractiveness can affect elections: A female candidate with a deeper voice (a trait conventionally considered to be less feminine and thus less attractive) may fail to benefit from the generic preference for lower-pitched voices, at least among male voters.



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Does the language-processing circuitry of the human brain deal with meaning apart from intonation?

Moreover, experimental studies that one of us (Klofstad) conducted with our colleagues Lasse Laustsen and Michael Bang Petersen at Aarhus University have also shown that the preference for leaders with lower-pitched voices can vary with the political views of the voter. This series of forced-choice experiments among Americans revealed that when the candidates are men, the bias in favor of leaders with lower voices is stronger among Republicans and self-described conservatives than among Democrats and self-described liberals. For example, in one of these experiments, 242 participants who were registered to vote as Republicans preferred male candidates with lower voices 63 percent of the time, whereas 289 registered Democrats preferred male candidates with lower voices only 54 percent of the time, a statistically significant difference.

This bias falls in line with the results of research by John Duckitt and Chris G. Sibley of the University of Auckland, and by John Hibbing of the University of Nebraska–Lincoln and his colleagues, among others, showing that Republicans and conservatives are more likely to view the world as a competitive and dangerous place than are Democrats and liberals. Because people with lower-pitched voices tend to have higher testosterone levels, and because individuals with more testosterone are more aggressive both physically and socially (as shown by Archer and Puts, among others), it perhaps makes sense that right-leaning individuals show a more marked preference for leaders with lower voices than do their left-leaning fellow citizens.

Stay Tuned for New Developments

Our studies and those of others show that, all other things being equal, voice pitch can affect our choice of leaders. But in real elections, all other things are never really equal. For example, we've already shown that an effect of voice pitch can be reversed when men are competing with women rather than with other men. Future tests might examine whether this result is specifically based on the gender pairing or can be attributed to other confounding effects. Another group of studies could explore how physical appearance—including height and weight, race, facial appearance, and many other traits—influences electability; more realistic experiments could present candidate voices and faces in tandem, to compare the effects of visual and vocal stimuli.

We have established that a speaker's voice pitch can significantly affect listeners' impressions of him or her, although many specific questions remain about how this influence works in various contexts. Meanwhile, another line of investigation awaits: an examination of how the listeners' perceptions of pitch are themselves influenced by the *content* of a speech. Does the language-processing circuitry of the human brain deal with meaning apart from intonation? Existing research suggests that this could be the case. For example, studies by Anthony Little of the University of Stirling and his colleagues, and by Brian Spisak at Vrije Universiteit Amsterdam and his colleagues, among others, have shown that leaders with more "masculine" faces (that is, faces that are wider in face and nose, with thinner lips and with larger and more angular jaws) are preferred in times of war. With these results in mind, we plan on designing experiments to test whether the preference for leaders with lower-pitched voices is stronger when the candidate speaks about foreign rather than domestic policy.

In this same vein, we are interested in whether candidates vary their voice pitch based on the audience they are addressing. It is already known from the work of Puts and his colleagues that men vary their voice pitch based on their perceptions of their own dominance relative to the man they are speaking with. Likewise, in their study of presidential candidates, Stanford Gregory and Timothy Gallagher of Kent State University in Ohio contend that speakers shift their tone of voice to more closely match the tone of the more dominant speaker in the conversation. Now that it has been documented that speakers tend to modulate their tone of voice based on whom they are speaking to, we plan to test whether speakers raise the pitch of their voice (that is, feminize it) when speaking to a female audience, and lower their voice pitch (and masculinize it) when speaking to a male audience.

Speaking About Hillary Clinton's Voice



Finally, a key proposition remains untested: People with lower voices may have an edge in elections for positions of leadership, but do people with lower voices actually make better leaders? On the one hand, if individuals with higher testosterone levels (as demonstrated by their deeper voices) are more aggressive, both physically and socially, a leader with a lower voice might be a more forceful advocate on behalf of his or her constituents. On the other hand, given that political conflict in modern times arises from a clash of complex ideologies at least as often as from contests of physical dominance, individuals with more testosterone and lower voices may be overly aggressive and less adept at cooperation. Perhaps our predilection for certain voice characteristics did yield better leadership at some point in our distant past, and it is possible that such predilections continue to serve us well in selecting good leaders. But it is also possible that an unconscious bias for lower voices causes us to vote against our best interests in today's increasingly interdependent world.

In any event, it is clear that even today this bias can have an impact on our decisions at the polls. Our perceptions of a leader's voice are unlikely to override our opinions on policy, partisanship, and all the other influences on electoral outcomes. The crucial point, however, is that nowadays, when many elections are won by the narrowest of margins, it is conceivable that these thin, impressionistic judgments can and do affect how we choose our leaders, and so we would do well to be aware of them.

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