

Listen, Follow Me: Dynamic Changes in Vocal Pitch Predict Leader Emergence

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Background

- Rank and dominance are expressed through nonverbal signals in almost every animal species
- Chimpanzees, for example, advertise their formidability and assert their dominance with the "bluff display", shown when competing for resources



- In humans, rank is signaled both through similar behavioral displays and vocal cues



Vocal Expression of Rank in Humans

- Both men and women with lower voices are perceived as physically larger and stronger, more formidable and socially dominant, and preferred as political leaders (e.g., Feinberg et al., 2005; Gregory, 1994; Klothstad et al., 2010; Puts et al., 2006; Sell et al., 2010; Tigue et al., 2012; Wolff & Puts, 2010)
- Suggests that stable, individual differences in pitch are systematically linked to rank attainment
- Given these findings, those who wish to increase their rank might benefit from deepening their voice during a social interaction
- Deepening pitch may convey the desire and motivation to seek dominance and aggress, which in turn induces submission and promotes rank
- However, studies have not examined spontaneous *within-person* changes in pitch, and whether such changes might be linked to social rank

Research Questions

- Do individuals spontaneously alter their vocal pitch during social interactions?
- Are alterations in pitch associated with rank attainment?
- If deepening pitch is linked to rank attainment, is this association due to perceived dominance?

Method

Participants and Procedure:

- Groups of 4-6 unacquainted individuals (N = 151) completed a 20-min decision task privately, then collaborative as a group, while video-recorded

Measurement of Changes in Vocal Pitch:



- The pitch (Hz) of each participant's first three **spontaneous** and **unscripted** utterances was assessed using vocal analysis software
- Change in pitch = $f_{0,3rd\ verbalization} - f_{0,1st\ verbalization}$

Measurement of Social Influence:

Group Member-Rated Influence:

- Participants rated all group members (in round-robin fashion) on 3 items: This person "led the task", "had high status", "was attended to" ($\alpha = .89$)
- Social Relations Model (Kenny, 1994) was utilized to derive a target effect score for the composite

Outside Observer-Rated Influence:

- 2 trained coders watched the video-recorded interactions and rated each participant on "degree of influence" (inter-rater $\alpha = .87$)

Behavioral Influence:

- We computed the discrepancy between each participant's **private response** on the decision task and the **group's collective response**, then summed across all items and reverse coded such that lower discrepancy indicates greater influence:

$$\text{Influence} = 1 - \sum_i \frac{|\text{Participant's private response on item } i - \text{Group's response on item } i|}{\dots}$$

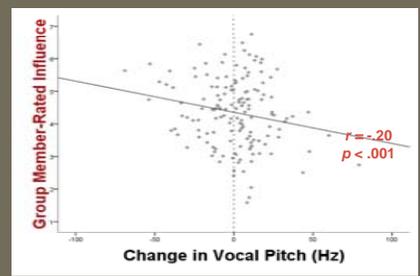
Measurement of Dominance:

- Participants rated all group members using the validated 8-item dominance subscale of the Dominance and Prestige Peer Rating Scales (Cheng et al., 2010) e.g., "I am afraid of him/her", This person "enjoyed having authority over others", "was willing to use aggressive tactics to get his/her way" ($\alpha = .93$)

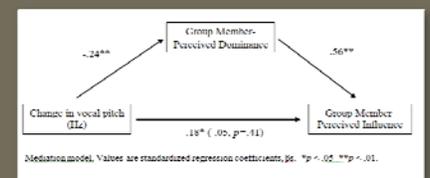
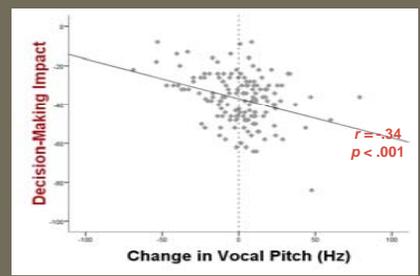
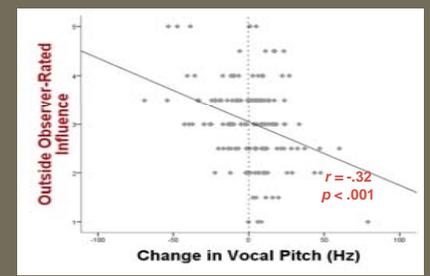
Results

- Individuals spontaneously alter their vocal pitch over the initial minutes of an interaction.

	Mean	Minimum	Maximum	SD
Change in Vocal Pitch (Hz)	.62	-68.91	79.00	21.19



- Those who deepen their pitch acquire higher social rank.



Perceived dominance significantly and fully mediates the effect of pitch change on social rank.

- The relation between deepened pitch and subsequent higher rank is due to greater perceived dominance.

Conclusion

Deepening one's voice increases perceived dominance and social rank.

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