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Human roars communicate upper-body strength more effectively than do screams or aggressive and distressed speech

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Publication date
12-06-2023

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Document Version
Published version

Citation for this work (American Psychological Association 7th edition)
Raine, J., Pisanski, K., Bond, R., Simner, J., & Reby, D. (2019). *Human roars communicate upper-body strength more effectively than do screams or aggressive and distressed speech* (Version 2). University of Sussex. https://hdl.handle.net/10779/uos.23466860.v2

Published in
PLoS ONE

Link to external publisher version
https://doi.org/10.1371/journal.pone.0213034

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SUPPORTING INFORMATION

for:

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Supplementary Tables

Table A. Factor loadings of acoustic variables on the discriminant functions (DF), for both sexes combined. Highest factor loadings (for each acoustic variable) are highlighted in bold.

	DF1	DF2	DF3
	Variance = 75%	Variance = 21%	Variance = 3%
Acoustic variable	Eigenvalue = 4.28	Eigenvalue = 1.22	Eigenvalue = 0.19
Mean amplitude (dB)	**-.63**	-.03	.34
Intensity CV (dB)	**.51**	-.12	.39
Amplitude modulation (%)	**-.37**	-.03	.06
Major F0 inflections	**.20**	-.11	-.14
Minimum F0 (Hz)	-.27	**.61**	.13
Max F0 (Hz)	-.21	**.57**	.30
Mean F0 (Hz)	-.28	**.57**	.33
HNR (dB)	.06	**.44**	.07
Jitter (Hz)	-.19	**-.24**	-.24
Shimmer (dB)	-.03	**.21**	-.21
Dominant formant frequency DFF4 (Hz)	.03	**.21**	-.01
Start – end F0 (Hz)	-.02	**-.20**	.02
Time of max intensity (%)	.13	.06	**-.38**
Centre of gravity (Hz)	-.20	.02	**.33**
F0 CV (Hz)	.05	-.01	**.28**
Minor F0 inflections	.09	.00	**-.23**

Table B. Factor loadings of acoustic variables on the discriminant functions (DF), for male vocalisers only. Highest factor loadings (for each acoustic variable) are highlighted in bold.

	DF1	DF2	DF3
	Variance = 75%	Variance = 21%	Variance = 3%
Acoustic variable	Eigenvalue = 4.28	Eigenvalue = 1.22	Eigenvalue = 0.19
Mean amplitude (dB)	**-.64**	-.06	-.36
Intensity CV (dB)	**.51**	-.04	-.22
Amplitude modulation (%)	**-.49**	-.23	.13
Major F0 inflections	**.18**	-.13	.03
Max F0 (Hz)	-.20	**.62**	-.24
Minimum F0 (Hz)	-.33	**.54**	-.16
Mean F0 (Hz)	-.31	**.54**	-.28
HNR (dB)	.13	**.45**	.00
Dominant formant frequency DFF4 (Hz)	.05	**.25**	-.05
Shimmer (dB)	-.05	**.22**	.12
Start – end F0 (Hz)	-.05	**-.16**	.15
Jitter (Hz)	-.24	-.26	**.33**
Centre of gravity (Hz)	-.26	.00	**-.30**
F0 CV (Hz)	.13	.07	**-.21**
Time of max intensity (%)	.14	.02	**.20**
Minor F0 inflections	.04	-.09	**.18**

Table C. Factor loadings of acoustic variables on the discriminant functions (DF), for female vocalisers only. Highest factor loadings (for each acoustic variable) are highlighted in bold.

	DF1	DF2	DF3
	Variance = 75%	Variance = 21%	Variance = 3%
Acoustic variable	Eigenvalue = 4.28	Eigenvalue = 1.22	Eigenvalue = 0.19
Mean amplitude (dB)	**.57**	-.03	.26
Intensity CV (dB)	**-.48**	-.14	.43
Amplitude modulation (%)	**.26**	.09	.23
Minimum F0 (Hz)	.21	**.58**	.01
Mean F0 (Hz)	.24	**.49**	.22
Max F0 (Hz)	.21	**.45**	.19
HNR (dB)	-.01	**.40**	.05
Jitter (Hz)	.14	**-.21**	-.06
Start – end F0 (Hz)	.00	**-.20**	.18
Dominant formant frequency DFF4 (Hz)	-.01	**.15**	-.09
Time of max intensity (%)	-.10	.08	**-.43**
Centre of gravity (Hz)	.13	.03	**.26**
F0 CV (Hz)	.01	-.05	**.24**
Shimmer (dB)	.02	.18	**-.23**
Minor F0 inflections	-.11	.07	**-.19**
Major F0 inflections	-.19	-.06	**-.19**

Table D. Standardised regression coefficients for acoustic predictors of men and women's physical strength. Separate stepwise regressions were computed for aggressive speech, aggressive roars, distressed speech, and distress screams.

Acoustic Variable	Females				Males			
	Agg S	Agg V	Dis S	Dis V	Agg S	Agg V	Dis S	Dis V
Duration (s)								
Mean F0 (Hz)								
Max F0 (Hz)								
Min F0 (Hz)								
Start – end F0 (Hz)								
F0CV (Hz)								
Minor F0 inflections								
Major F0 inflections	**.42***							
Mean intensity (dB)								
Time of max intensity (%)								
intensity CV (dB)								
Shimmer (dB)								
Jitter (Hz)								
HNR (dB)								
Amplitude modulation (%)			**.55****					
Centre of gravity (Hz)								
Dominant formant frequency DFF4 (Hz)	**-.47****	**-.47****	**-.32***					

* $p < .05$ ** $p < .01$

Table E. Standardised regression coefficients for acoustic predictors of men and women's height. Separate stepwise regressions were computed for aggressive speech, aggressive roars, distressed speech, and distress screams.

Acoustic Variable	Females				Males			
	Agg S	Agg V	Dis S	Dis V	Agg S	Agg V	Dis S	Dis V
Duration (s)								
Mean F0 (Hz)								
Max F0 (Hz)								
Min F0 (Hz)	**-.39***							
Start – end F0 (Hz)								
F0CV (Hz)					**-.47****			
Minor F0 inflections								
Major F0 inflections								
Mean intensity (dB)								
Time of max intensity (%)								
intensity CV (dB)		**.38***						
Shimmer (dB)								
Jitter (Hz)								
HNR (dB)								
Amplitude modulation (%)			**.36***					
Centre of gravity (Hz)	**.55****							
Dominant formant frequency DFF4 (Hz)								**-.40***

* $p < .05$ ** $p < .01$

Table F. Standardised regression coefficients for acoustic predictors of listeners' ratings of men and women's physical strength. Separate stepwise regressions were computed for aggressive speech, aggressive roars, distressed speech, and distress screams.

Acoustic Variable	Females				Males			
	Agg S	Agg V	Dis S	Dis V	Agg S	Agg V	Dis S	Dis V
Duration (s)		**.53*****		**.21***			**-.19***	
Mean F0 (Hz)								**-.49*****
Max F0 (Hz)			**-.29*****					
Min F0 (Hz)								
Start – end F0 (Hz)						**.40****		
F0CV (Hz)		**-.38*****					**-.28****	**-.18***
Minor F0 inflections								
Major F0 inflections								
Mean intensity (dB)	**.80*****	**.86*****	**1.11*****	**.71*****	**.37****	**.36***	**.95*****	**.60*****
Time of max intensity (%)								
intensity CV (dB)						**-.34***		
Shimmer (dB)		**-.33****			**-.18***			
Jitter (Hz)						**.43****	**-.32***	
HNR (dB)	**-.35*****	**-.72*****	**-.34*****				**-.76*****	**-.23***
Amplitude modulation (%)				**.40*****	**.58*****			**.40****
Centre of gravity (Hz)								
Dominant formant frequency DFF4 (Hz)								

* $p < .05$ ** $p < .01$ *** $p < .001$

Table G. Standardised regression coefficients for acoustic predictors of listeners' ratings of men and women's height. Separate stepwise regressions were computed for aggressive speech, aggressive roars, distressed speech, and distress screams.

Acoustic Variable	Females				Males			
	Agg S	Agg V	Dis S	Dis V	Agg S	Agg V	Dis S	Dis V
Duration (s)								
Mean F0 (Hz)		**-.54*****			**-.49***	**-.54****	**-1.34*****	**-.80*****
Max F0 (Hz)			**-.34***					
Min F0 (Hz)							**.69***	
Start – end F0 (Hz)								
F0CV (Hz)								
Minor F0 inflections								
Major F0 inflections								
Mean intensity (dB)		**.70*****	**.78*****		**.76****	**.32***	**.90*****	**.46****
Time of max intensity (%)						**-.28***		
intensity CV (dB)			**.32****					
Shimmer (dB)		**-.38***						
Jitter (Hz)						**.42****		**.34***
HNR (dB)			**-.45*****					
Amplitude modulation (%)								
Centre of gravity (Hz)	**.48****			**-.52****				
Dominant formant frequency DFF4 (Hz)								

* $p < .05$ ** $p < .01$ *** $p < .001$