

Supplemental Material S1. Gender and femininity/masculinity rating scales types by study.

Study	Scale	Terminology
Coleman (1971) ^a	2 AFC	female/male
Coleman (1976)	2 AFC 7-point EAI	female/male least amount of [femaleness/maleness] to most amount of [femaleness/maleness] ^b
Lass, Hughes, Bowyer, Waters, and Bourne (1976) ^a	2 AFC	female/male
Spencer (1988)	2 AFC 7-point EAI	female/male least amount of [femaleness/maleness] to most amount of [femaleness/maleness] ^b
Wolfe, Ratusnik, and Smith (1990)	2 AFC 7-point EAI	female/male extremely feminine-sounding speech and voice to extremely masculine-sounding speech
Gelfer and Schofield (2000)	2 AFC 7-point EAI	female/male very feminine to very masculine
Van Borsel, De Cuypere, and Van den Berghe (2001)	10-point EAI	not at all female to very female
Gelfer and Mikos (2005)	2 AFC	female/male
Gorham-Rowan and Morris (2006)	VAS	masculine to feminine
Carew, Dacakis, and Oates (2007)	VAS	very masculine to very feminine
McNeill, Wilson, Clark, and Deakin (2008)	VAS	very masculine to very feminine
Hillenbrand and Clark (2009) ^a	2 AFC	man/woman
Holmberg, Oates, Dacakis, and Grant (2010) ^a	VAS	very male to very female
Hancock, Krissinger, and Owen (2011) ^a	VAS	masculine to feminine
King, Brown, and McCrea (2012)	2 AFC 7-point EAI	female/male ultra masculine speech/voice to ultra feminine speech/voice
Palmer, Dietsch, and Searl (2012)	2 AFC	female/male
Gelfer and Van Dong (2013) ^a	2 AFC 7-point EAI 7-point EAI	female/male very feminine to not at all feminine very masculine to not at all masculine

Gelfer and Tice (2013) ^a	2 AFC 7-point EAI 7-point EAI	female/male very feminine to not at all feminine very masculine to not at all masculine
Junger et al. (2013)	2 AFC	female/male
Hancock, Colton, and Douglas (2014)	VAS	masculine male to feminine male to masculine female to feminine female
Skuk and Schweinberger (2014)	2 AFC	female/male
Donai and Lass (2015)	2 AFC	2 AFC - female/male
Hardy et al. (2016) ^a	2AFC VAS	2 AFC - female/male very masculine to very feminine
Donai and Halbritter (2017)	2 AFC	female/male
Hancock and Pool (2017)	2 AFC VAS	female/male very masculine to very feminine
Schwarz et al. (2018) ^a	VAS	more masculine to more feminine
Gallena, Stickels, and Stickels (2018)	3 AFC	female/male/gender ambiguous
Houle and Levi (2021)	VAS	feminine to masculine
Dahl and Mahler (2020)	5-point EAI	very male to very female
Kawitzky and McAllister (2020)	VAS	definitely male to definitely female
Brown, Dahl, Cler, and Stepp (2020)	VAS	definitely male to guessing male to guessing female to definitely female
Hardy, Boliek, et al. (2020)	DME without modulus 3 AFC	feminine woman/man/ambiguous
Hardy, Rieger, Wells, and Boliek (2020) ^a	DME without modulus 2 AFC	feminine female/male
Merritt and Bent (2020) ^a	9-point EAI DME without modulus	very masculine to very feminine feminine

Abbreviations: AFC, alternative forced choice task; EAI, equal appearing interval; VAS, visual analog scale; DME, direct magnitude estimation.

^a Study included additional auditory-perceptual rating scales not discussed here.

^b Femininity was rated when the speaker was identified as female, and masculinity was rated when the speaker was identified as male.

References

- Brown, K. M., Dahl, K. L., Cler, G. J., & Stepp, C. E. (2020). Listener age and gender diversity: Effects on voice-based perception of gender. *Journal of Voice*, 35(5), 739–745. <https://doi.org/10.1016/j.jvoice.2020.02.004>
- Carew, L., Dacakis, G., & Oates, J. M. (2007). The effectiveness of oral resonance therapy on the perception of femininity of voice in male-to-female transsexuals. *Journal of Voice*, 21(5), 591–603. <https://doi.org/10.1016/j.jvoice.2006.05.005>
- Coleman, R. O. (1971). Male and female voice quality and its relationship to vowel formant frequencies. *Journal of Speech and Hearing Research*, 14(3), 565–577. <https://doi.org/10.1044/jshr.1403.565>
- Coleman, R. O. (1976). A comparison of the contributions of two voice quality characteristics to the perception of maleness and femaleness in the voice. *Journal of Speech and Hearing Research*, 19(1), 168–180. <https://doi.org/10.1044/jshr.1901.168>
- Dahl, K. L., & Mahler, L. A. (2020). Acoustic features of transfeminine voices and perceptions of voice femininity. *Journal of Voice*, 34(6), 961.e19. <https://doi.org/10.1016/j.jvoice.2019.05.012>
- Donai, J. J., & Halbritter, R. M. (2017). Gender identification using high-frequency speech energy: Effects of increasing the low-frequency limit. *Ear and Hearing*, 38(1), 65–73. <https://doi.org/10.1097/AUD.0000000000000353>
- Donai, J. J., & Lass, N. J. (2015). Gender identification from high-pass filtered vowel segments: The use of high-frequency energy. *Attention, Perception, and Psychophysics*, 77(7), 2452–2462. <https://doi.org/10.3758/s13414-015-0945-y>
- Gallena, S. J. K., Stickels, B., & Stickels, E. (2018). Gender perception after raising vowel fundamental and formant frequencies: Considerations for oral resonance research. *Journal of Voice*, 32(5), 592–601. <https://doi.org/10.1016/j.jvoice.2017.06.023>
- Gelfer, M. P., & Mikos, V. A. (2005). The relative contributions of speaking fundamental frequency and formant frequencies to gender identification based on isolated vowels. *Journal of Voice*, 19(4), 544–554. <https://doi.org/10.1016/j.jvoice.2004.10.006>
- Gelfer, M. P., & Schofield, K. J. (2000). Comparison of acoustic and perceptual measures of voice in male-to-female transsexuals perceived as female versus those perceived as male. *Journal of Voice*, 14(1), 22–33. [https://doi.org/10.1016/S0892-1997\(00\)80092-2](https://doi.org/10.1016/S0892-1997(00)80092-2)
- Gelfer, M. P., & Tice, R. M. (2013). Perceptual and acoustic outcomes of voice therapy for male-to-female transgender individuals immediately after therapy and 15 months later. *Journal of Voice*, 27(3), 335–347. <https://doi.org/10.1016/j.jvoice.2012.07.009>
- Gelfer, M. P., & Van Dong, B. R. (2013). A preliminary study on the use of vocal function exercises to improve voice in male-to-female transgender clients. *Journal of Voice*, 27(3), 321–334. <https://doi.org/10.1016/j.jvoice.2012.07.008>
- Gorham-Rowan, M., & Morris, R. (2006). Aerodynamic analysis of male-to-female transgender voice. *Journal of Voice*, 20(2), 251–262. <https://doi.org/10.1016/j.jvoice.2005.03.004>
- Hancock, A., Colton, L., & Douglas, F. (2014). Intonation and gender perception: Applications for transgender speakers. *Journal of Voice*, 28(2), 203–209. <https://doi.org/10.1016/j.jvoice.2013.08.009>
- Hancock, A., Krissinger, J., & Owen, K. (2011). Voice perceptions and quality of life of transgender people. *Journal of Voice*, 25(5), 553–558. <https://doi.org/10.1016/j.jvoice.2010.07.013>
- Hancock, A., & Pool, S. F. (2017). Influence of listener characteristics on perceptions of sex and gender. *Journal of Language and Social Psychology*, 36(5), 599–610. <https://doi.org/10.1177/0261927X17704460>
- Hardy, T. L. D., Boliek, C. A., Aalto, D., Lewicke, J., Wells, K., & Rieger Jana, M. (2020). Contributions of voice and nonverbal communication to perceived masculinity–femininity for cisgender and transgender communicators. *Journal of Speech, Language, and Hearing Research*, 63(4), 931–947. https://doi.org/10.1044/2019_JSLHR-19-00387

- Hardy, T. L. D., Boliek, C. A., Wells, K., Dearden, C., Zalmanowitz, C., & Rieger, J. M. (2016). Pretreatment acoustic predictors of gender, femininity, and naturalness ratings in individuals with male-to-female gender identity. *American Journal of Speech-Language Pathology*, 25(2), 125–137. https://doi.org/10.1044/2015_AJSLP-14-0098
- Hardy, T. L. D., Rieger, J. M., Wells, K., & Boliek, C. A. (2020). Acoustic predictors of gender attribution, masculinity–femininity, and vocal naturalness ratings amongst transgender and cisgender speakers. *Journal of Voice*, 34(2), 300.e11–300.e326. <https://doi.org/10.1016/j.jvoice.2018.10.002>
- Hillenbrand, J. M., & Clark, M. J. (2009). The role of f0 and formant frequencies in distinguishing the voices of men and women. *Attention, Perception, & Psychophysics*, 71(5), 1150–1166. <https://doi.org/10.3758/APP.71.5.1150>
- Holmberg, E. B., Oates, J. M., Dacakis, G., & Grant, C. (2010). Phonetograms, aerodynamic measurements, self-evaluations, and auditory perceptual ratings of male-to-female transsexual voice. *Journal of Voice*, 24(5), 511–522. <https://doi.org/10.1016/j.jvoice.2009.02.002>
- Houle, N., & Levi, S. V. (2021). Effect of phonation on perception of femininity/masculinity in transgender and cisgender speakers. *Journal of Voice*, 35(3), 497.e23–497.e37. <https://doi.org/10.1016/j.jvoice.2019.10.011>
- Junger, J., Pauly, K., Bröhr, S., Birkholz, P., Neuschaefer-Rube, C., Kohler, C., Schneider, F., Derntl, B., & Habel, U. (2013). Sex matters: Neural correlates of voice gender perception. *Neuro-Image*, 79, 275–287. <https://doi.org/10.1016/j.neuroimage.2013.04.105>
- Kawitzky, D., & McAllister, T. (2020). The effect of formant biofeedback on the feminization of voice in transgender women. *Journal of Voice*, 34(1), 53–67. <https://doi.org/10.1016/j.jvoice.2018.07.017>
- King, R. S., Brown, G. R., & McCrea, C. R. (2012). Voice parameters that result in identification or misidentification of biological gender in male-to-female transgender veterans. *International Journal of Transgenderism*, 13(3), 117–130. <https://doi.org/10.1080/15532739.2011.664464>
- Lass, N. J., Hughes, K. R., Bowyer, M. D., Waters, L. T., & Bourne, V. T. (1976). Speaker sex identification from voiced, whispered, and filtered isolated vowels. *The Journal of the Acoustical Society of America*, 59(3), 675–678. <https://doi.org/10.1121/1.380917>
- McNeill, E. J. M., Wilson, J. A., Clark, S., & Deakin, J. (2008). Perception of voice in the transgender client. *Journal of Voice*, 22(6), 727–733. <https://doi.org/10.1016/j.jvoice.2006.12.010>
- Merritt, B., & Bent, T. (2020). Perceptual evaluation of speech naturalness in speakers of varying gender identities. *Journal of Speech, Language, and Hearing Research*, 63(7), 2054–2069. https://doi.org/10.1044/2020_JSLHR-19-00337
- Palmer, D., Dietsch, A., & Searl, J. (2012). Endoscopic and stroboscopic presentation of the larynx in male-to-female transsexual persons. *Journal of Voice*, 26(1), 117–126. <https://doi.org/10.1016/j.jvoice.2010.10.014>
- Schwarz, K., Fontanari, A. M. V., Costa, A. B., Soll, B. M. B., da Silva, D. C., de Sá Villas-Bôas, A. P., Cielo C. A., Bastilha, G. R., Ribeiro, V. V., Dorfman, M. E. K. Y., & Lobato, M. I. R. (2018). Perceptual-auditory and acoustical analysis of the voices of transgender women. *Journal of Voice*, 32(5), 602–608. <https://doi.org/10.1016/j.jvoice.2017.07.003>
- Skuk, V. G., & Schweinberger, S. R. (2014). Influences of fundamental frequency, formant frequencies, aperiodicity, and spectrum level on the perception of voice gender. *Journal of Speech, Language, and Hearing Research*, 57(1), 285–296. [https://doi.org/10.1092-4388\(2013/12-0314\)](https://doi.org/10.1092-4388(2013/12-0314))
- Spencer, L. E. (1988). Speech characteristics of male-to-female transsexuals: A perceptual and acoustic study. *Folia Phoniatrica et Logopaedica*, 40(1), 31–42. <https://doi.org/10.1159/000265881>
- Van Borsel, J., De Cuypere, G., & Van den Berghe, H. (2001). Physical appearance and voice in male-to-female transsexuals. *Journal of Voice*, 15(4), 570–575. [https://doi.org/10.1016/S0892-1997\(01\)00059-5](https://doi.org/10.1016/S0892-1997(01)00059-5)

Wolfe, V. I., Ratusnik, D. L., & Smith, F. H. (1990). Intonation and fundamental frequency in male-to-female transsexuals. *Journal of Speech and Hearing Disorders*, 55(1), 43–50. <https://doi.org/10.1044/jshd.5501.43>