Before we start…

Go to:
whosspeaking.wixsite.com/listen

whosspeaking.wixsite.com/listen

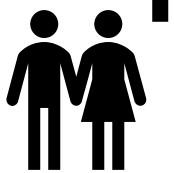
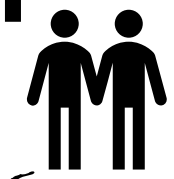
Listen to the three audio clips on the website, and use the polls to share your impressions of each speaker

whosspeaking.wixsite.com/listen

When you respond, think about:


age


gender


sexuality


accent


emotional state


and anything else that comes to mind!

When you’re done, scroll down the page and have a look at other people’s responses in the word clouds

whosspeaking.wixsite.com/listen

Have you done it?

If you don’t want to share your thoughts, that’s okay, just listen to the voices and think about your impressions of the speakers.

Does ‘more masculine’ mean ‘less feminine’?

Measures of ‘perceived gender’ in an investigation of the role of voice quality on gender perception

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Supervised by: Jane Stuart-Smith (Glasgow), Clara Cohen (Glasgow), and Felix Schaeffler (QMU)

Roadmap

1. Intro [Now]
2. Why did I get you to do that? [1:07]
3. Research questions and overview [4:00]
4. Predictions [4:45]
5. Methods [3:37]
6. Results [8:06]
7. What this all means [12:17]

References [14:48]

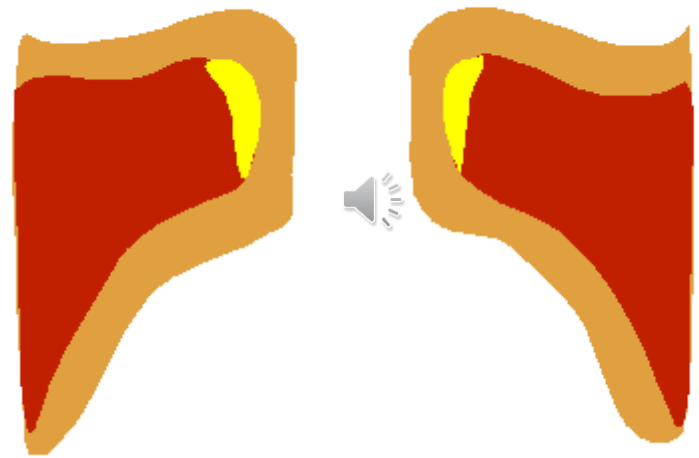
Additional content [14:53]

2. Why did I get you to do that?

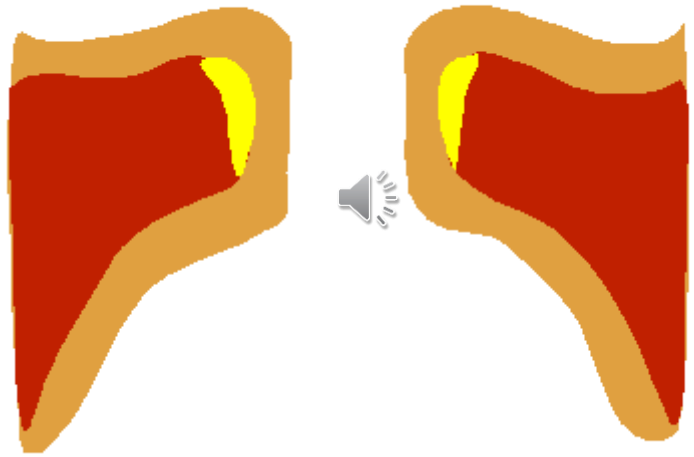
Speaker A

Speaker B

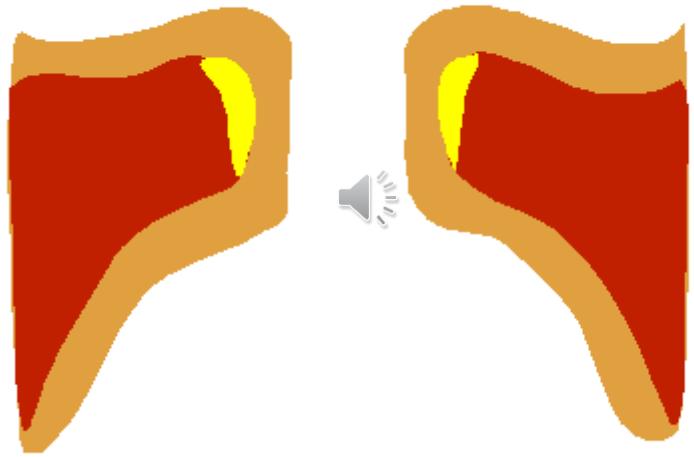
Speaker C



Pitch



Pitch



Pitch

Speaker A
120 Hz
‘Typical male’ pitch

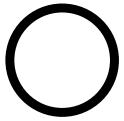
Speaker B
165 Hz
‘Ambiguous’ pitch

Speaker C
210 Hz
‘Typical female’ pitch

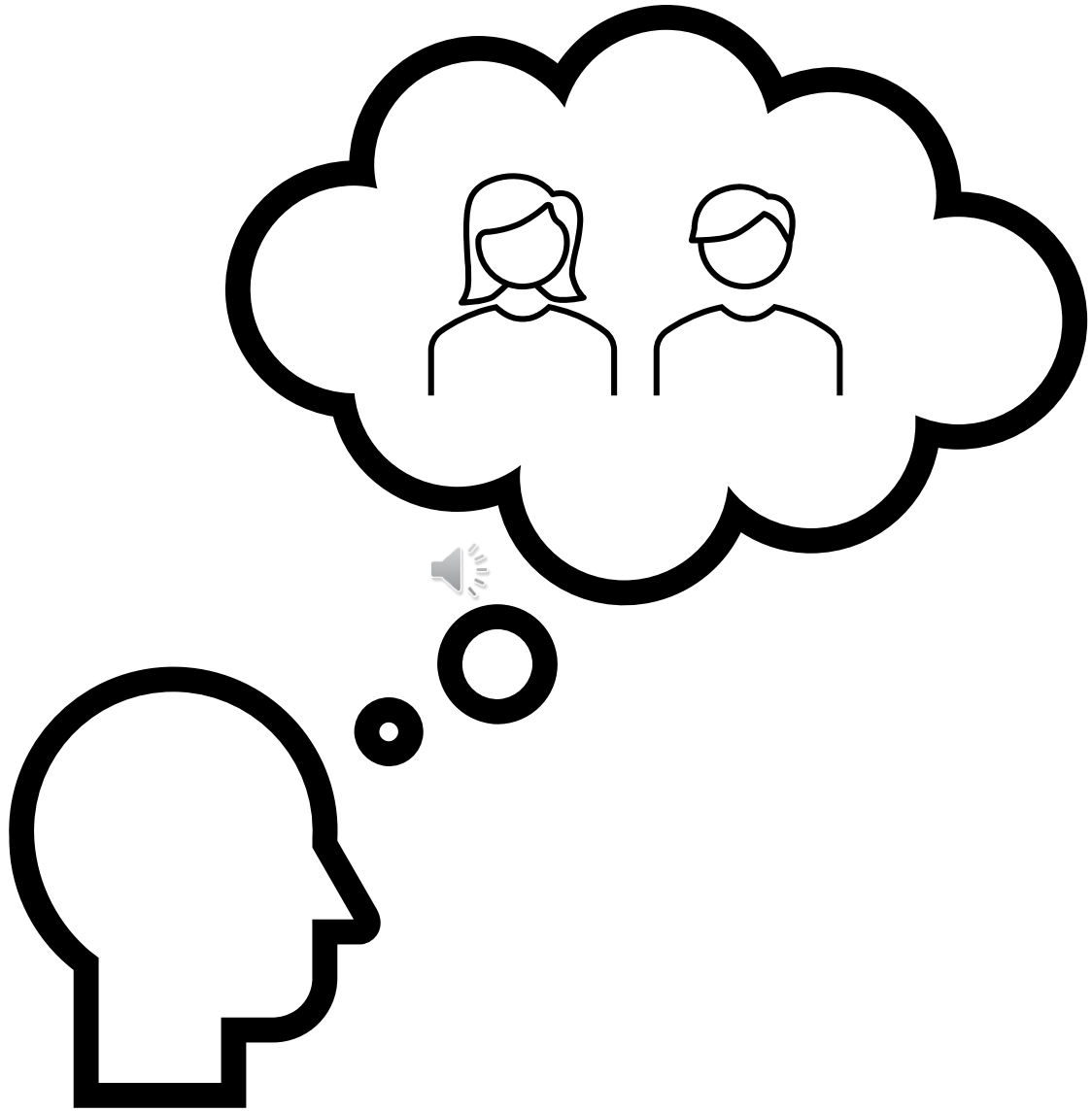
Voice quality

Speaker A
Breathy voice

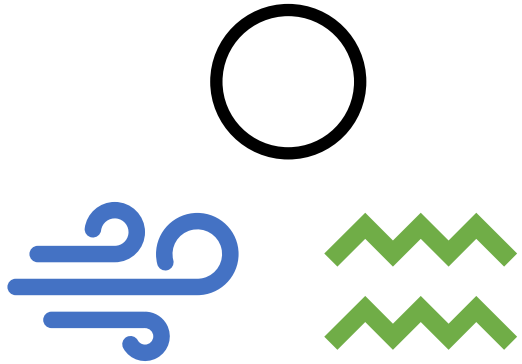
Speaker B
Modal voice



Speaker C
Creaky voice



Important



?

What do we know so far?

feminine
or
female speaker

Addington 1968, Andrews & Schmidt 1997, Bishop & Keating 2012, Gorham-Rowan & Morris 2006, Greer 2015, Lee 2016, Palmer, Dietsch & Searl 2012, Porter 2012, Skuk & Schweinberger 2014, Van Borsel, Jansen & De Bodt 2009

- Not found by all studies

Booz & Ferguson 2016, Holmberg et al. 2010, King, Brown & McCrea 2010, Owen & Hancock 2010

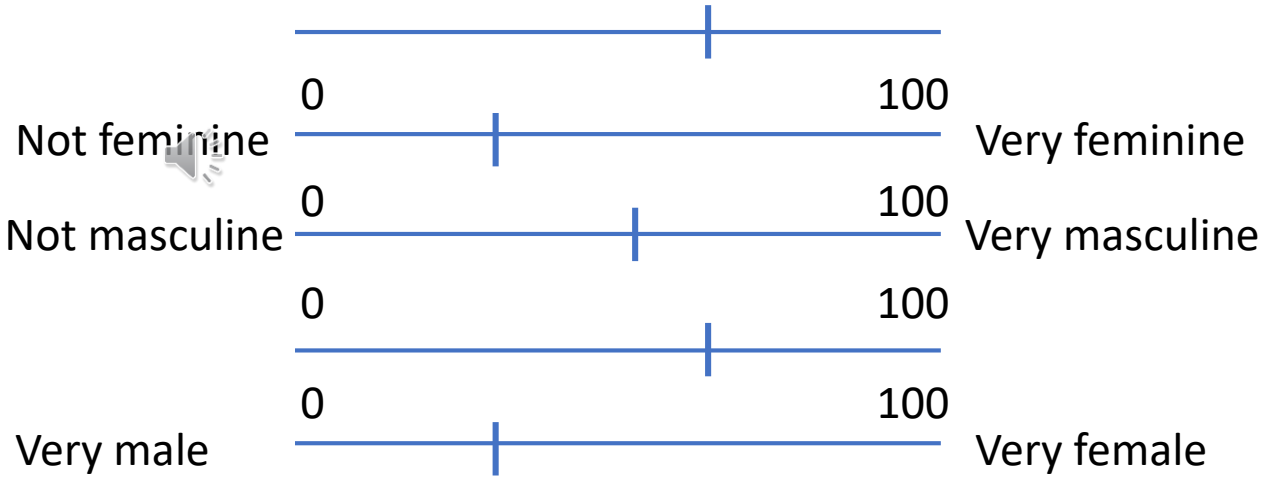
- Less on creaky voice

Greer 2015, Lee 2016

Why the conflicting results?

- Leung et al. 2018 suggest:
  - Different studies measure ‘perceived gender’ differently

How masculine/feminine does this voice sound?



Male or female?

- Male
- Female

Does this voice sound more like a man or a woman?

- Masculine
- Feminine

- Male
- Female
- Can’t tell

Why did I get you to do that?

What I’m interested in:

- In an experiment, how would the way that we measured ‘perceived gender’ affect what we found?

3. Research questions and overview

Research questions

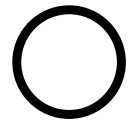
1. How does voice quality affect our perception of gender?
   - How does it interact with the perceptions we get from pitch?
2. How does the type of response used to measure `perceived gender' affect whether voice quality contributes to gender perception?

The present study: Overview

- Stimuli:

210 Hz (‘typical female’)
165 Hz (‘ambiguous’)
120 Hz (‘typical male’)

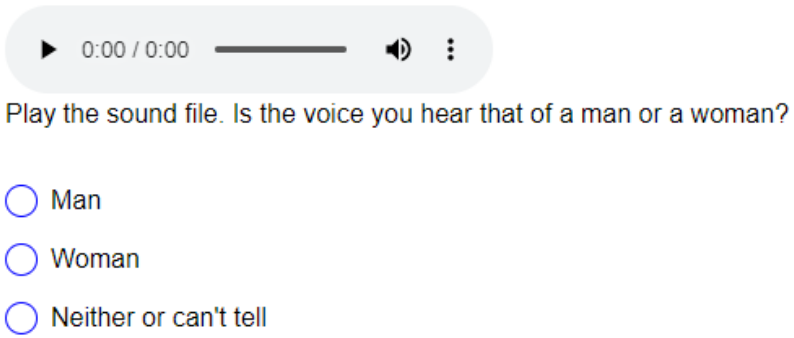
Breathy

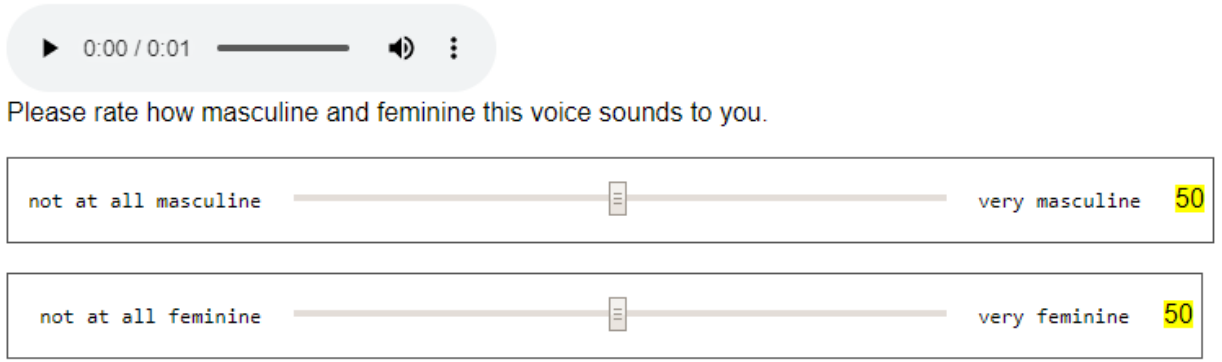


Modal

Creaky

- Questions:





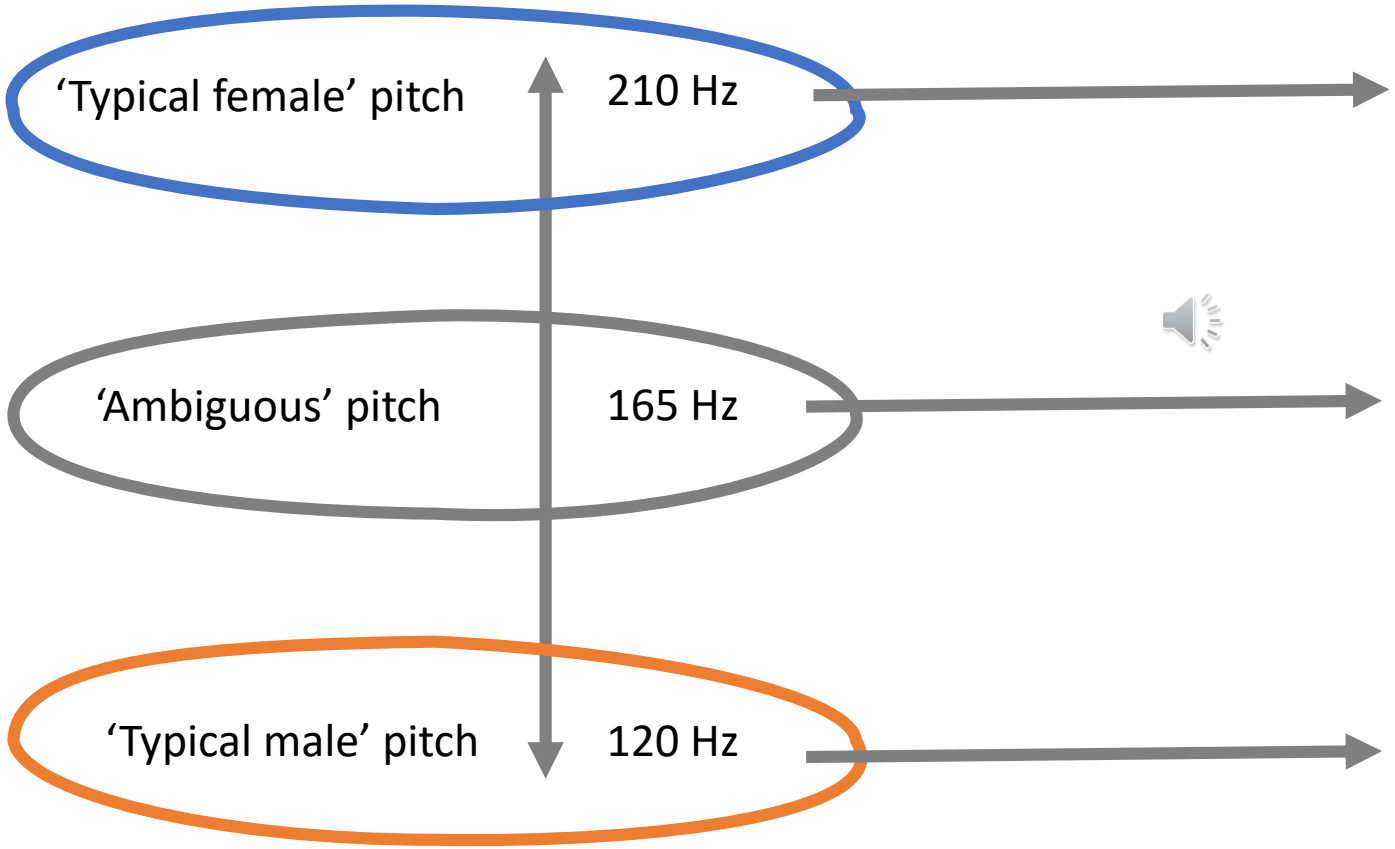
4. Predictions

How does voice quality affect our perception of gender?

Breathy => More feminine / more likely to be a woman?

Creaky => More masculine / more likely to be a man?

Predictions



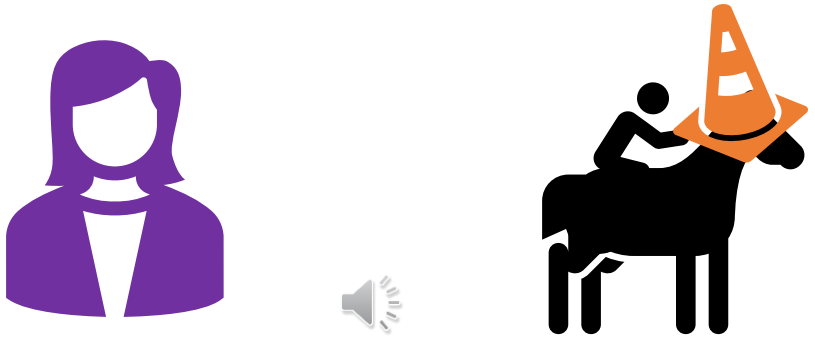
Voice quality may only influence perception of masculinity/femininity

Voice quality may influence perception of gender of speaker (man/woman/ neither or can’t tell)

Voice quality may only influence perception of masculinity/femininity

5. Methods

Stimuli

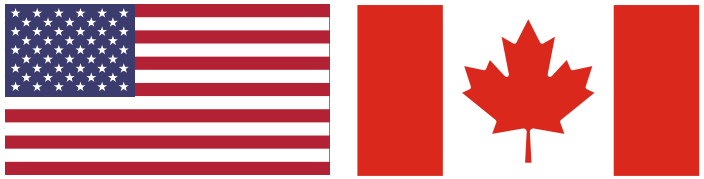


Female speaker from Glasgow

Stimuli

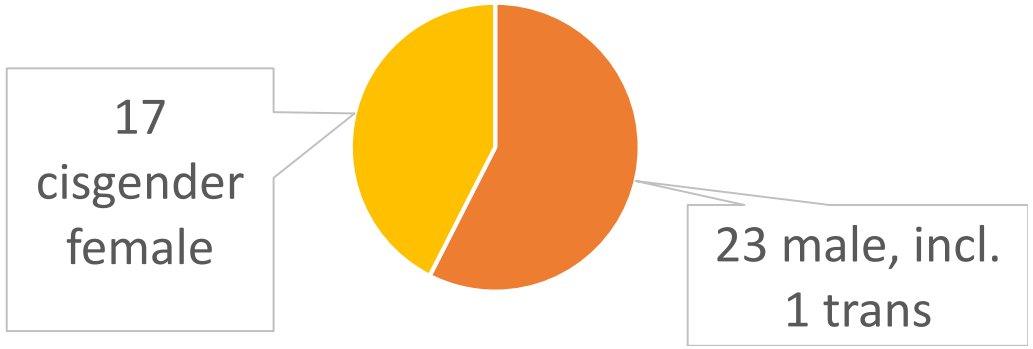
	Breathy		Modal		Creaky	
	Natural	Synthesized	Natural	Synthesized	Natural	Synthesized
210 Hz						
165 Hz						
120 Hz						

Pitch changes created using Praat (Boersma & Weenink 2019); Synthesized differences in voice quality created using KlattGrid (Klatt & Klatt 1990, Weenink 2009) in Praat.



40 participants

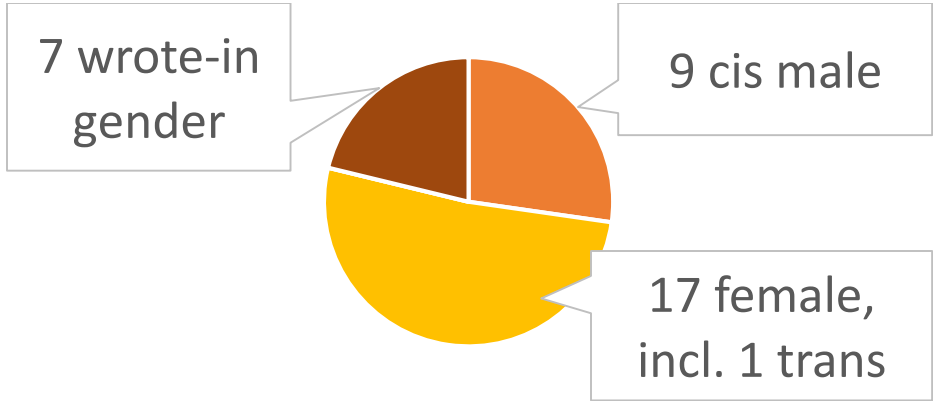
aged **18-62**



Prolific

33 participants

aged **18-45**

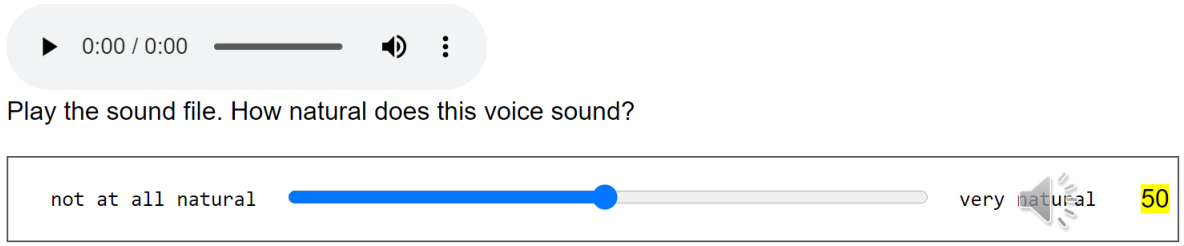


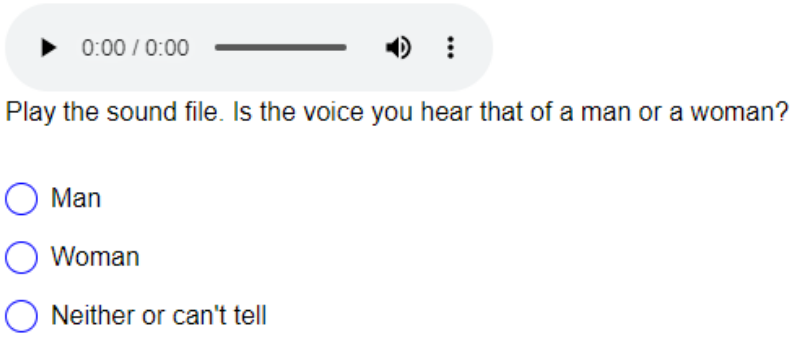
in-person

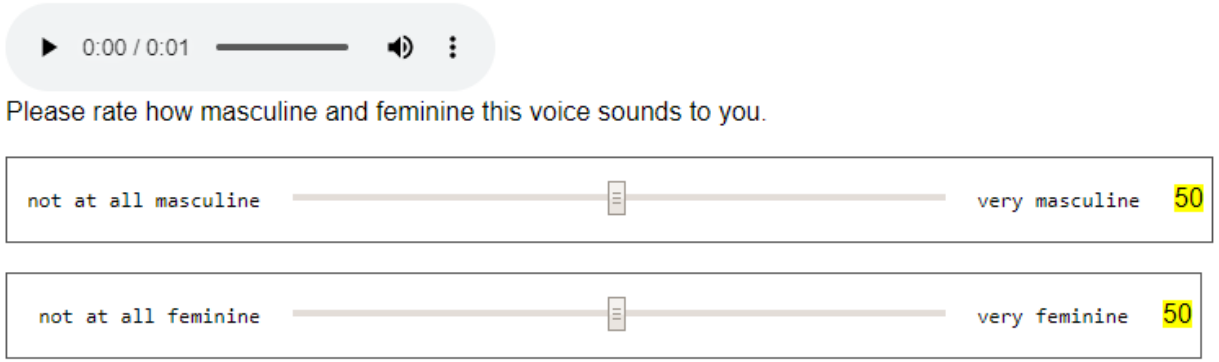
University of Glasgow

The experiment

PsyToolkit (Stoet 2010, 2017)







Qualitative data

1. What did you pay attention to when deciding whether you thought the voices sounded like a man or a woman?
2. What did you pay attention to when rating how masculine/feminine a voice sounded?
3. Do you have any further comments about your experience completing this experiment?

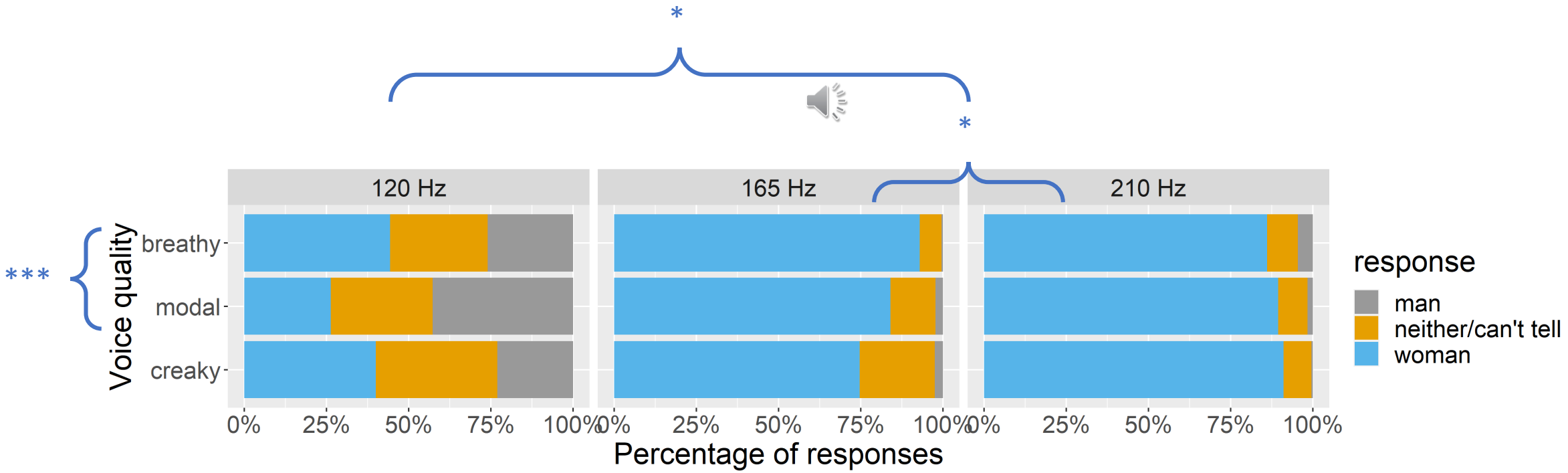
6. Results

How does voice quality affect our perception of gender?

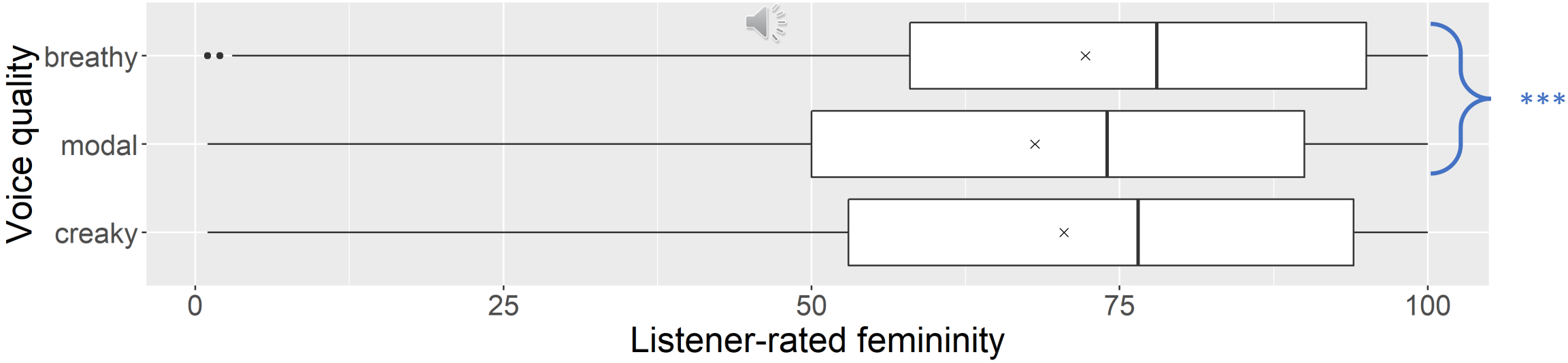
And how does it interact with the perceptions we get from pitch?

Breathy voice increases likelihood of a ‘woman’ response

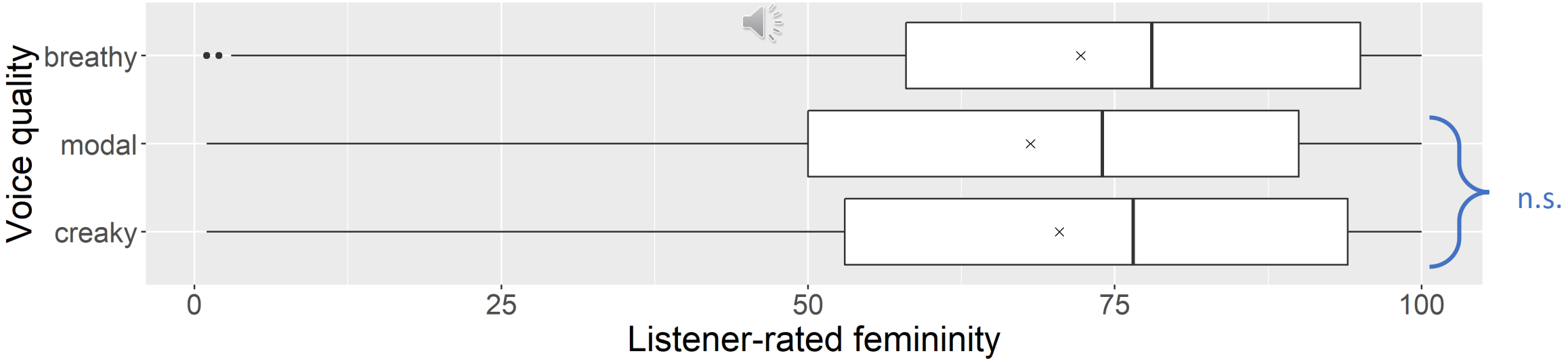
- The effect of breathy voice increases as pitch decreases



Breathy voice increases ratings of femininity



Creaky voice has no effect on ratings of femininity

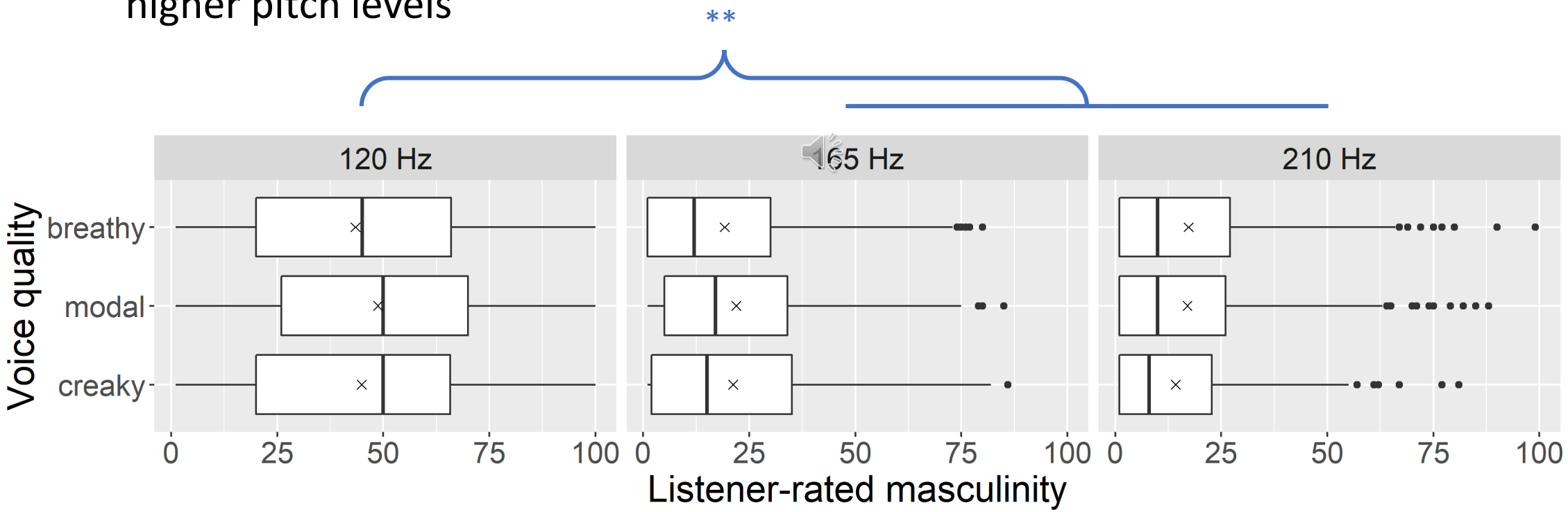


Voice quality affects perception of masculinity

- Listeners rated breathy voice and creaky voice significantly less masculine than modal voice

Voice quality affects perception of masculinity

- Breathy voice at 120 Hz rated significantly less masculine than breathy voice at higher pitch levels



How does the type of response we collect affect our results?

How does the type of response we collect affect our results?

Creaky voice

- Less masculine
- NOT more feminine
- NOT less likely to be categorised as a woman

The response we collect affects what we find!

How does the type of response we collect affect our results?

1. What did you pay attention to when deciding whether you thought the voices sounded like a man or a woman?
2. What did you pay attention to when rating how masculine/feminine a voice sounded?
3. Do you have any further comments about your experience completing this experiment?

How does the type of response we collect affect our results?

The same for some

‘I paid attention to the same things when deciding whether man or woman, masculine or feminine’

‘same as before’ for Q1 & Q2

‘higher rating [on masculine/feminine scales] came when i was more sure of the gender ’

…but different for others

‘Sometimes a more masculine voice meant a less feminine one but not always so it was good to have the two sliders’

‘there should have been an option for “women speaker but with a masculine voice”’

How we perceive gender interacts with how we perceive other characteristics

Age

"What might have been young female could well have been late adolescent male. Also, it was challenging to guess between possible post-menopausal female versus male with high-registered voices."

"Sometimes I found it difficult to decide whether the voice was a man or a woman because it sounded to me like a young boy"

How we perceive gender interacts with how we perceive other characteristics

Sexuality

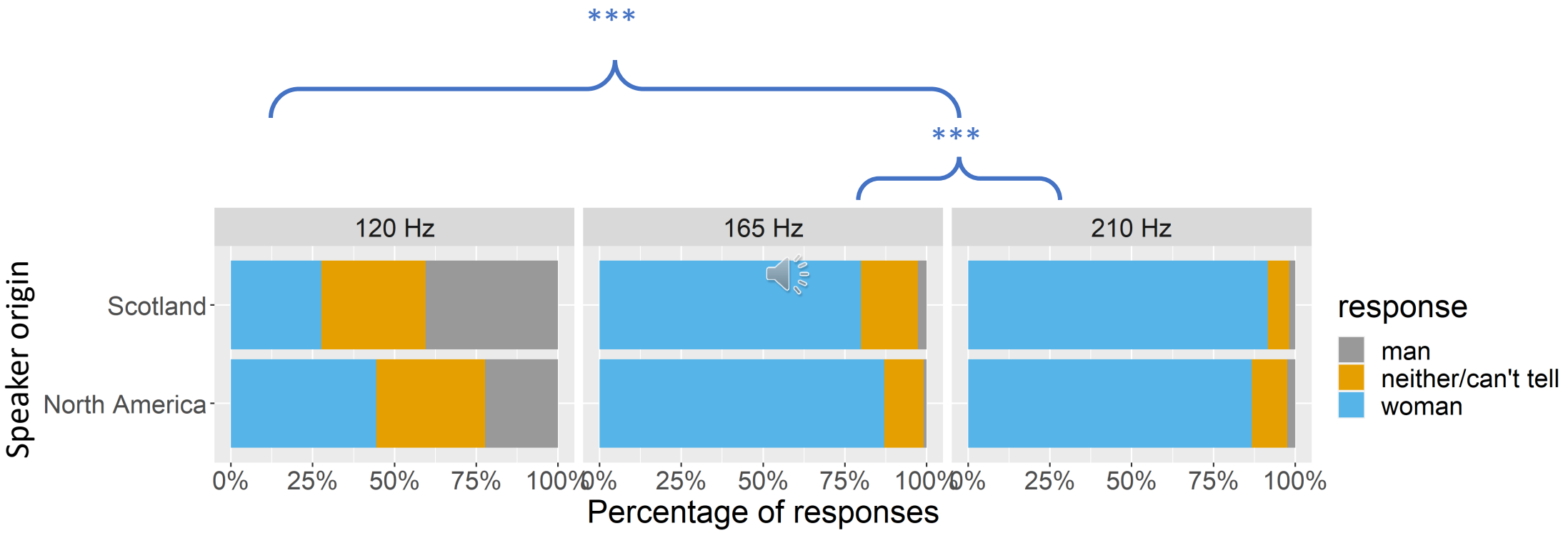
> “A lot of the ones I put as "masculine" were because I could imagine gay men I know saying it in that tone/pitch/whatever it's called.”

How we perceive gender interacts with how we perceive other characteristics

Trans status

Two participants noted the voices sounded like transgender people they knew

Background may influence gender perception



7. What does this all mean?

Voice quality does influence gender perception

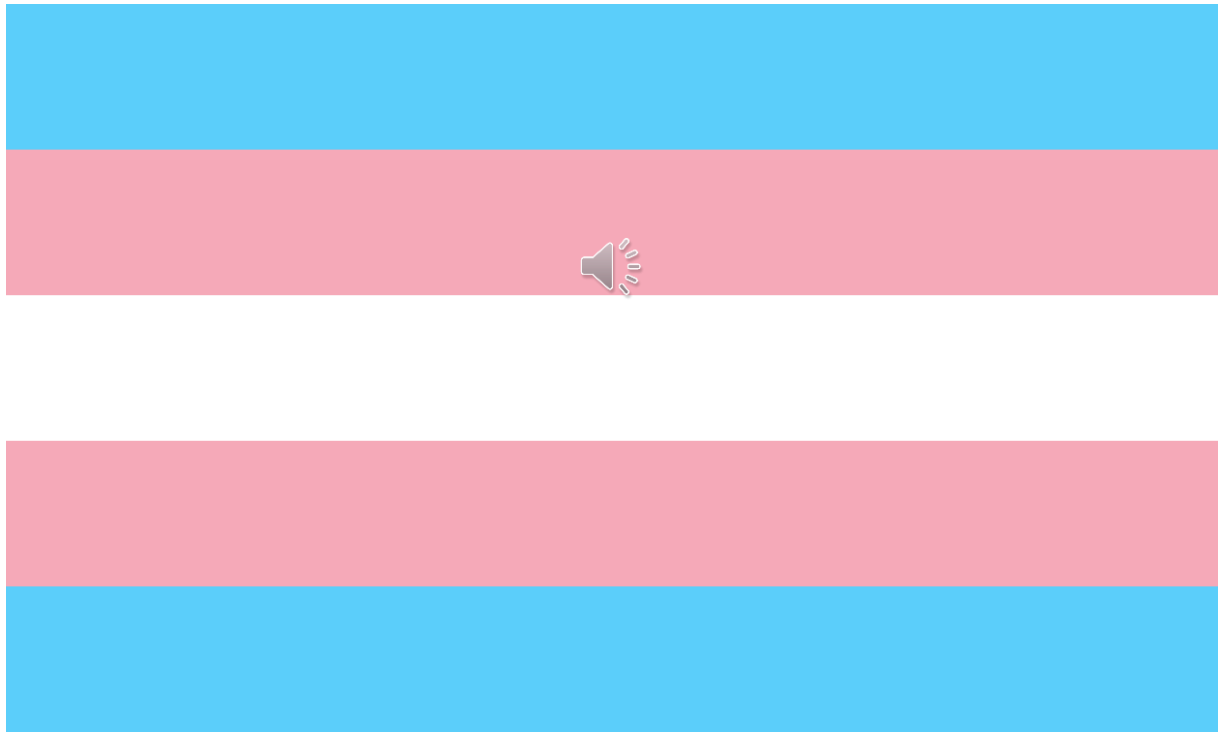
- Listeners more likely to give a ‘woman’ response for breathy voices
- Breathy voice perceived as less masculine & more feminine

- Creaky voice decreases perception of masculinity

The way we perceive gender is mediated by our experiences and sociolinguistic background

- N. American vs Scottish listeners have different thresholds for gender perception in terms of pitch
- Masculinity, femininity, and gender (woman/‘not woman’) are equivalent for some listeners, but not others
- Perception of gender intersects with perception of other characteristics

A call for trans-centred gender perception research



Thank you for listening!

- Please feel free to get in touch with questions or comments
- Look at additional material for more examples of stimuli, model outputs, more results

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Additional content

Statistical analysis

Dependent variables:

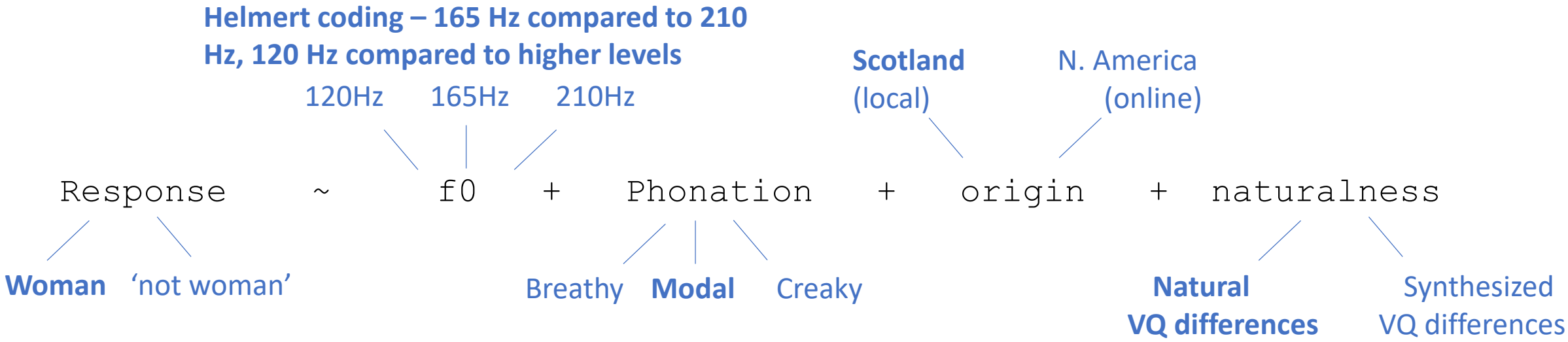
- Perceived speaker gender (woman, man or neither/can't tell)

  grouped together for model, 'not woman'

  - Generalised linear mixed-effects regression using lme4

- Perceived femininity (1-100)
- Perceived masculinity (1-100)
  - Linear mixed-effects regression using lme4

Statistical analysis

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+ Phonation:f0 + f0:origin

+ (1|sentence) + (1|participant)
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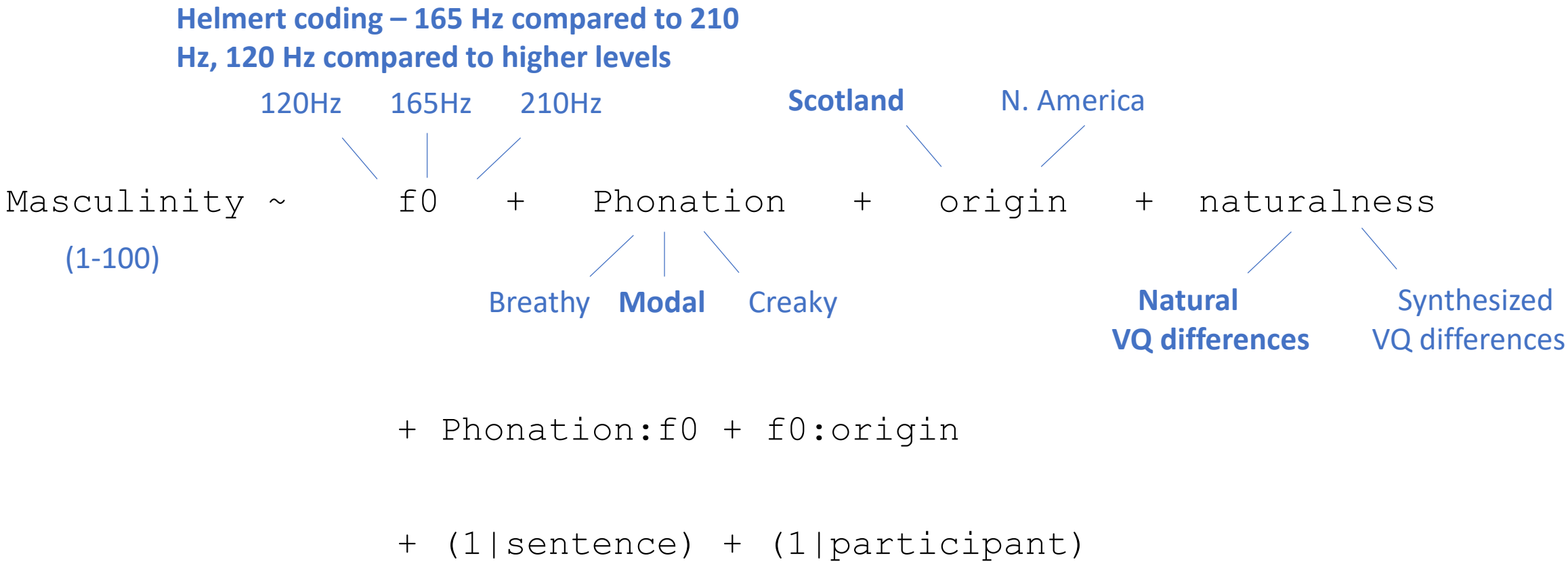
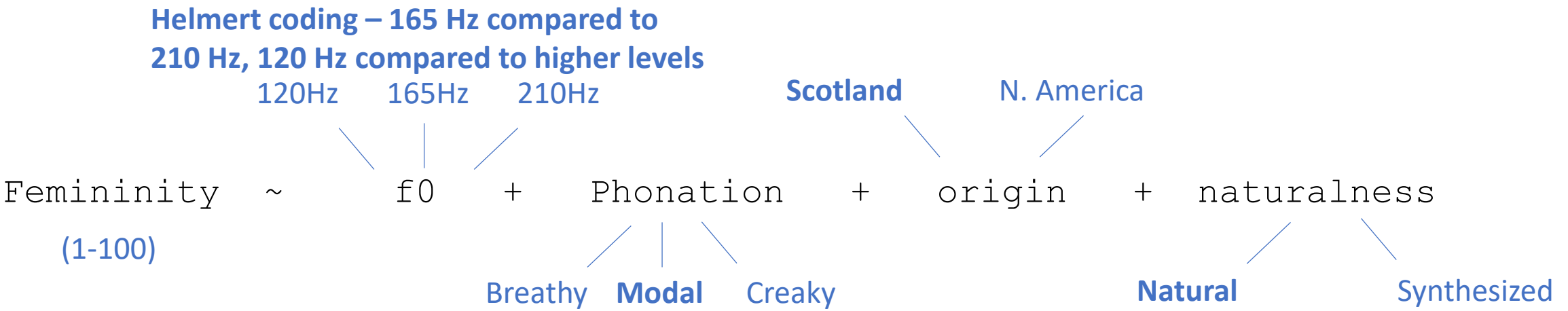
Statistical analysis



Statistical analysis



~~+ Phonation:f0~~ + f0:origin

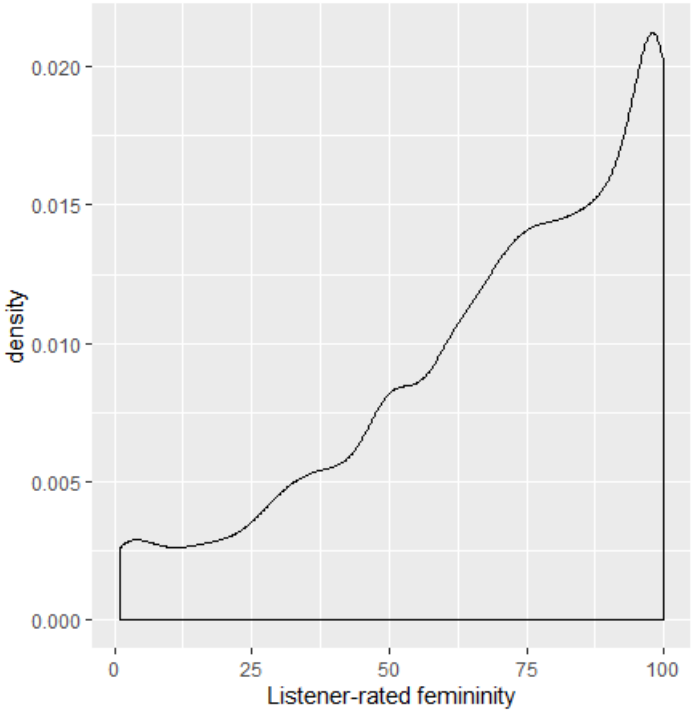
+ (1|sentence) + (1|participant)

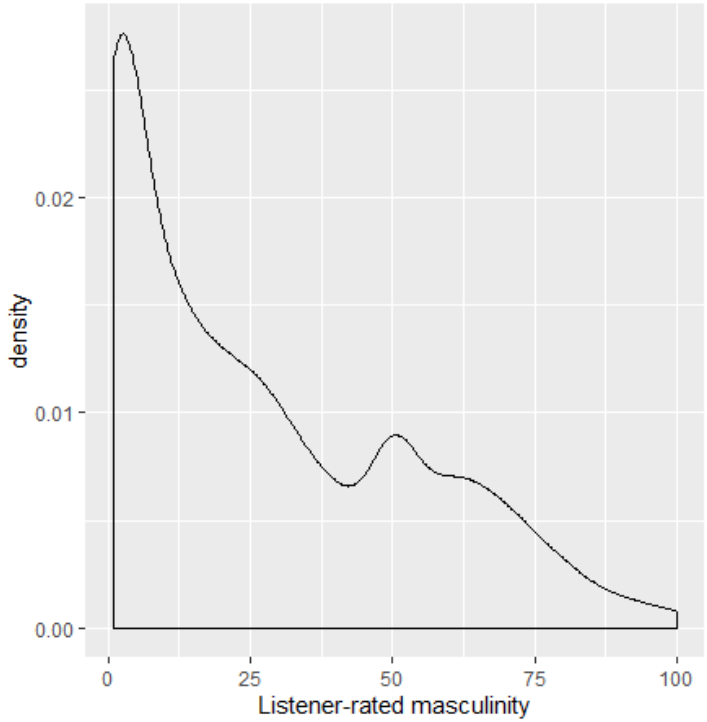
Model outputs

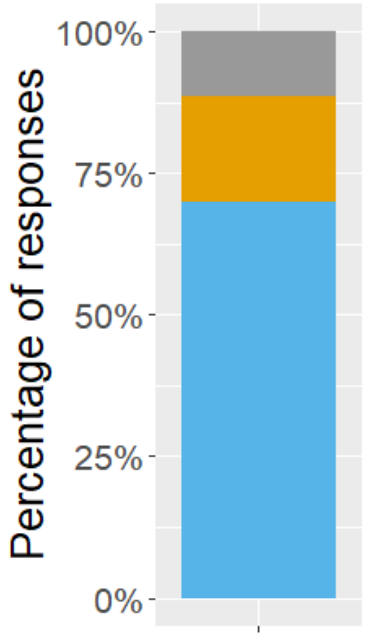
	Dependent variable:		
	femininity	masculinity	response
	linear mixed-effects	*linear mixed-effects*	*generalized linear mixed-effects*
	(1)	(2)	(3)
Constant	78.301***	28.099***	−2.672***
	(2.300)	(2.102)	(0.370)
f0Helmertsc210vs165	−9.623***	7.238***	1.634**
	(1.322)	(1.661)	(0.498)
f0Helmertsc120Hzvshigherlevels	−28.719***	35.752***	5.835***
	(1.248)	(1.436)	(0.410)
VQbreathy	4.312***	−2.625**	−0.916***
	(1.145)	(0.832)	(0.260)
VQcreaky	1.233	−2.363**	−0.051
	(1.257)	(0.859)	(0.227)
originNorth America	0.381	−8.837**	−0.531
	(2.771)	(2.701)	(0.423)
naturalnesssynthesized	−20.405***	12.019***	2.657***
	(0.827)	(0.646)	(0.184)
f0Helmertsc210vs165:VQbreathy		−2.063	−1.731*
		(1.917)	(0.679)
f0Helmertsc120Hzvshigherlevels:VQbreathy		−4.688**	−1.071*
		(1.817)	(0.439)
f0Helmertsc210vs165:VQcreaky		1.957	1.112
		(2.104)	(0.612)
f0Helmertsc120Hzvshigherlevels:VQcreaky		−2.130	−1.579**
		(1.816)	(0.507)
f0Helmertsc210vs165:originNorth America	4.230**	−4.535***	−1.621***
	(1.335)	(1.349)	(0.295)
f0Helmertsc120Hzvshigherlevels:originNorth America	3.117**	−11.583***	−1.187***
	(1.149)	(1.166)	(0.234)
Log Likelihood	−16,887.490	−16,926.600	−1,287.036
Note:			*p<0.05; **p<0.01; ***p<0.001

Keep in mind!

- One female speaker as the original voice
- Data is skewed towards ‘woman’, ‘not masculine’ and ‘feminine’ responses overall







Grouped together as ‘not woman’ in the model!

response
man
neither/can't tell
woman

Synthesized stimuli decrease ratings of femininity