Clearly, fame isn't everything: Talker familiarity does not mitigate the perceptual consequences of talker variability

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Introduction

Speech perception is facilitated when hearing a single talker speak (**talker adaptation**, a.k.a. talker normalization)

- Responses to speech from a single talker are often faster and/or more accurate than speech from multiple talkers

Speech perception is also facilitated when the talker is familiar

- Superior recognition of speech in noise or amidst other speech
- Familiarity can range from recently trained-on voices (Nygaard et al., 1994) to long-term spouses (Johnsrude et al., 2013)

Do these benefits to speech perception interact?

- Familiar talkers in Magnuson et al. (2021) were participants' family members. Neither reaction times nor accuracy exhibited significant interactions between talker consistency and talker familiarity (but these null results could be due to any number of factors)

Here, listeners recognized words spoken by familiar (*famous*; U.S. Presidents) or unfamiliar (*non-famous*; other politicians) talkers in *single-talker* and *mixed-talker* blocks.

We hypothesized that familiarity would help listeners overcome talker variability, making the effects of talker consistency (i.e., difference in response times across *single-talker* and *mixed-talker* blocks) smaller for *famous* talkers than *non-famous* talkers.

Method

Participants

All were native English speakers with normal hearing
Expt. 1: 45 undergrad participants (mean age = 19.6)
Expt. 2: 42 undergrad participants (mean age = 20.8)

Stimuli

"do" and "to" and their homophones excised from political speeches on americanrhetoric.com

Procedure

30-minute online study using Gorilla

- Headphone Screen (Woods et al., 2017)
- Exposure* (Expt. 2 only)
- 4 blocks of speeded word recognition (*Famous*/*Non-Famous* x *Single*/*Mixed Talkers*)
  - -*Famous*: last 5 U.S. Presidents
  - -*Non-Famous*: age-matched less-famous politicians
- Questionnaire* (Expt. 1 only)
  - -Listen to "do"/"to"; can you name this talker?
  - -Listen to a sentence; can you name this talker?
  - -See the talker's name; do you know who this is?
- Rate political interest on a scale from 1 (low) to 10 (high)

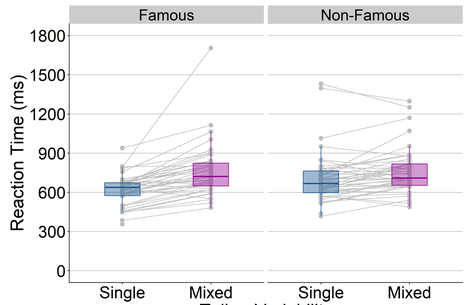
*Maibauer et al. (2014) predicted larger familiarity benefits if participants heard familiar voices before the main task. To test this, in Expt. 2, the questionnaire was moved before the word recognition task as an exposure phase. Participants heard each talker's "do"/"to" and a sentence while seeing their name without any responses required.

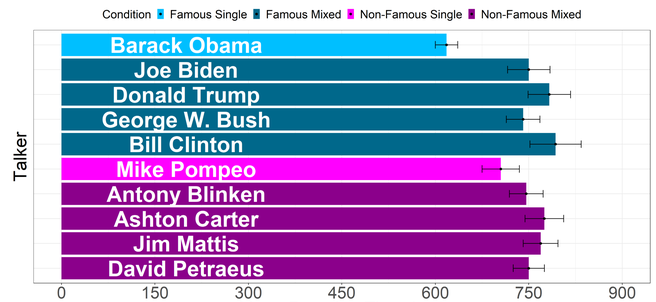
Results

Experiment 1: Talker consistency and familiarity each resulted in faster word recognition, but they interacted in an unexpected manner.

Word Recognition (LMER)

- **Familiarity**: faster responses to *famous* talkers (t = 2.93, p = .040)
- **Block**: faster responses to *single* talkers (t = 4.63, p = .010)
- **Familiarity x Block**: the talker consistency effect (difference in response times between *single-talker* and *mixed-talker* blocks) was larger for *famous* talkers (t = -2.98, p = .034), contrary to predictions





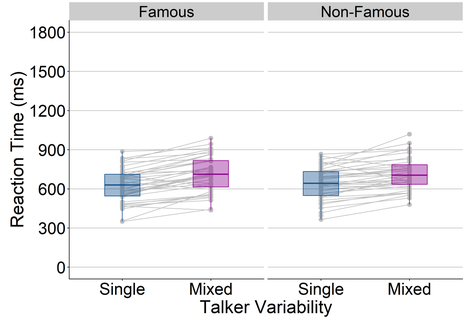
Questionnaire

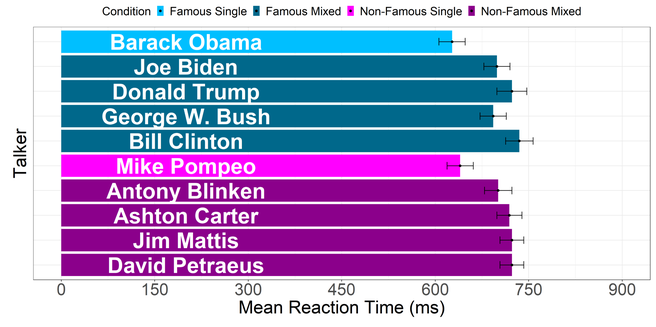
- Recognition from "do"/"to": *Famous* (M = 18%) > *Non-Famous* (M = 0%) (t = 7.17, p < .0001)
- Recognition from a sentence: *Famous* (M = 48%) > *Non-Famous* (M = 0%) (t = 16.44, p < .0001)
- Recognition by name: *Famous* (M = 92%) > *Non-Famous* (M = 17%) (t = 16.92, p < .0001)

Experiment 2: Talker consistency resulted in faster word recognition, but familiarity benefits were extinguished. Talker consistency and familiarity did not interact as predicted.

Word Recognition (LMER)

- **Familiarity**: no difference in responses for *famous* and *non-famous* talkers (t = 1.62, p = .166)
- **Block**: faster responses to a *single* talker (t = 2.93, p = .028)
- **Familiarity x Block**: familiarity did not affect the talker consistency effect (t = -1.77, p = .135), contrary to predictions





Questionnaire

- Recognition by name: *Famous* (M = 97%) > *Non-Famous* (M = 28%) (t = 12.95, p < .0001)

Discussion

Talker consistency led to faster word recognition; talker familiarity led to faster word recognition (in Expt. 1); but, perceptual benefits from talker consistency and familiarity did not interact as predicted

- Why not? Talker consistency has strong bottom-up components (acoustic variability; Stilp & Theodore, 2020) whereas talker familiarity has strong top-down components (short-term / long-term memory; see Magnuson et al., 2021 for discussion)

Tests of talker familiarity must also consider recency effects

- Making talkers familiar through training (with recency effects) is often contrasted with novel talkers (no recency effects)
- The exposure phase of Expt. 2 produced recency effects for *famous* and *non-famous* talkers, which might have extinguished the familiarity benefits observed in Expt. 1

Limitations

Familiarity was assumed rather than explicitly controlled

- But, familiarity effects were evident in Expt. 1 and in superior talker recognition in the questionnaire

"do"/"to" stimuli were highly acoustically variable, as they were excised from running speech

- Duration was included as a fixed effect in LMER. Responses were faster to shorter words, but this was separate from familiarity and/or talker consistency effects

Talker recognition is difficult from short-duration speech (mean duration of "do"/"to" = 188ms)

- But, benefits of familiarity do not depend on recognizing the talker (Holmes et al., 2018)

Difficult to draw firm conclusions from null results

- But, if you collect enough of them, they just might be telling you something about the null hypothesis actually being true

Conclusions

- Talker consistency aids speech perception, as does talker familiarity, but these two did not interact as expected
- Recency effects might diminish or even extinguish familiarity benefits
- Combining these results with those of Magnuson et al. (2021), talker familiarity simply might not augment the perceptual benefits from talker consistency

References

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