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Using mobile phone data for sociolinguistic research in the 21st century: THE MOBILE PHONE EFFECT ON /f, θ, d, h/

Krestina V. Christensen, Michaela Hejná and Mette Hjortshøj Sørensen
Aarhus University, Denmark

vendelbo.k@live.dk

Introduction

- Speech is affected by mobile phone transmission (shown for vowels) [1,2,3]. Although it has improved significantly since landline [4, 5].
- This study, investigated **consonants** and was conducted to reflect natural conditions outside controlled environments with background noise and significant network traffic.
- For the sociolinguist, the problem of using mobile transmitted speech is that it is unclear how network codecs affect those parts of the acoustic signal that translate to linguistically meaningful units (consonants).

Research Question1: Are voiceless obstruents affected by the GSM network and AMR wideband codecs and if so to what extent?

Research Quesition2: To what extent can mobile transmitted speech affect the potential usefulness of telephone gathered data with a focus on consonants?

Research Question3: How are /θ, f/ affected by the GSM network and AMR wideband codecs in relation to similarity and intensity?

Conclusion

RQ1. The findings indicate a partial or complete deletion of the obstruents across the conditions: /h/ and post aspiration suffer the most and bursts are generally attenuated in intensity.

RQ2. Even with the most recent technological advances, sociophoneticians should not use mobile phone data to investigate consonantal variation.

RQ3. /θ/ and /f/ become less intense and more alike.

Next step

- To what extent do listeners rely on the context when hearing and interpreting mobile phone transmitted speech, considering the compromised quality of the signal?

Methods

Participants: The participants were 6 female speakers, aged between 20 to 30 years, all fluent in English. Three of the participants were native speakers of English (Speakers1-3). The other three were native speakers of Danish, but with a background in English at the university (Speakers 4-6)

Materials: Wordlist data - 144 tokens of /h, d/ across the 6 speakers; read speech - 106 tokens of /f, θ/ in total from 1 speaker.

Procedure:

- The participants read the story of Arthur the Rat and a list of words.
- The data for both tasks was obtained in 1. a quiet controlled setting (**Qmic & Qphone**), and 2. in a natural non-optimal outdoor setting with heavy background noise and network traffic (**Nphone**).
- In both cases, the signal was recorded from a a Samsung A5 2015 with the speaker calling from an Iphone 5s.
- Both phones were smartphones compatible with the 4G network.

Two recordings were conducted simultaneously:

- **Qmic** in the phonetics lab with a Zoom H2n directly of the speaker,
- **Qphone** from the Samsung A5 with a Zoom H5 connected to a AKG C520 headmounted microphone.

Results

Figure 1 (wordlist): /hɪd/ produced by Speaker3 in the three different recording conditions [6].

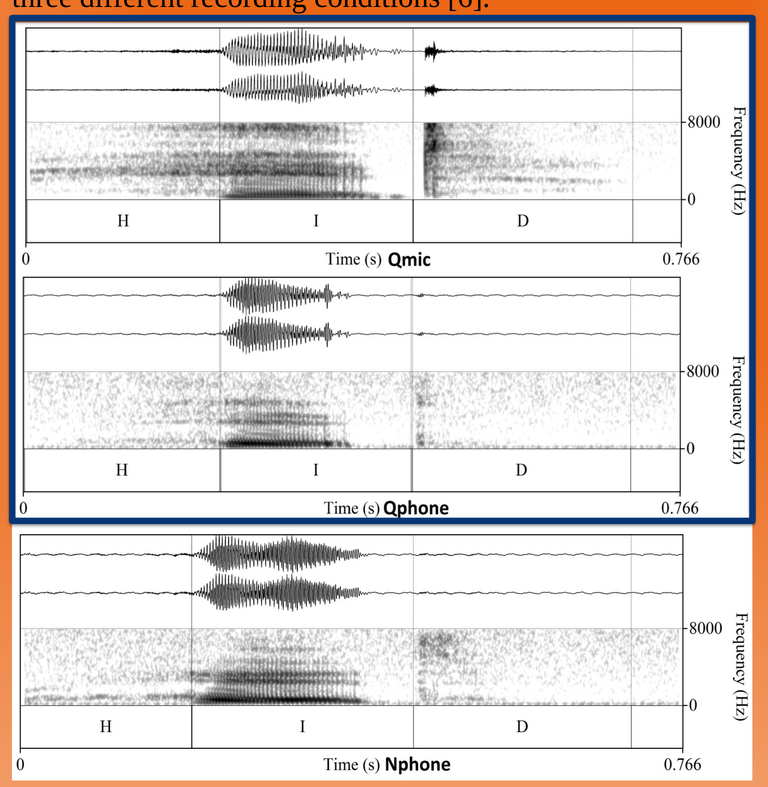


Figure 2 (wordlist): /hid/ produced by speaker6 in the three different recording conditions [6].

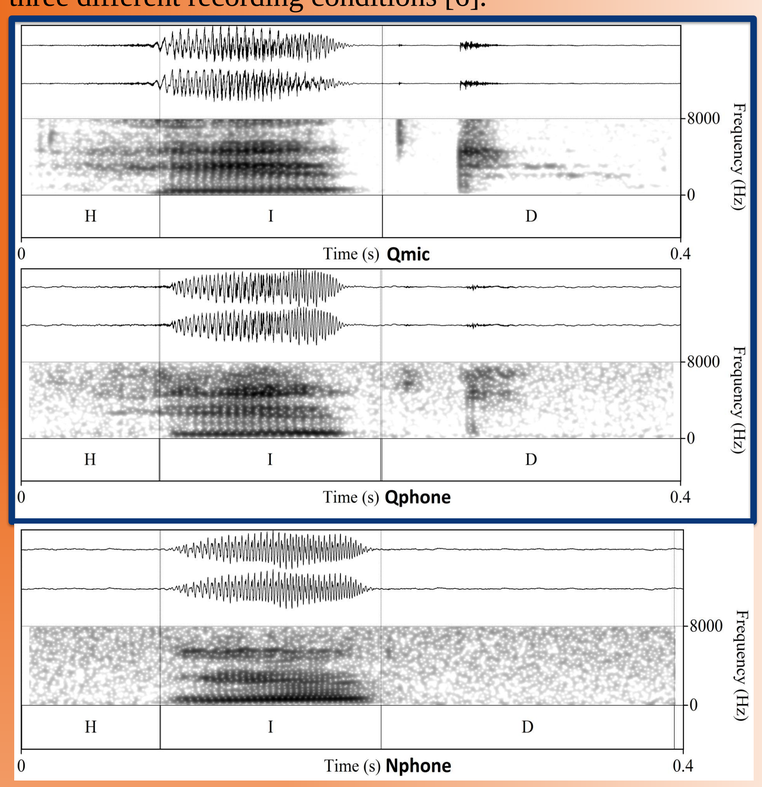


Figure3: Spectralmoment analysis speaker1

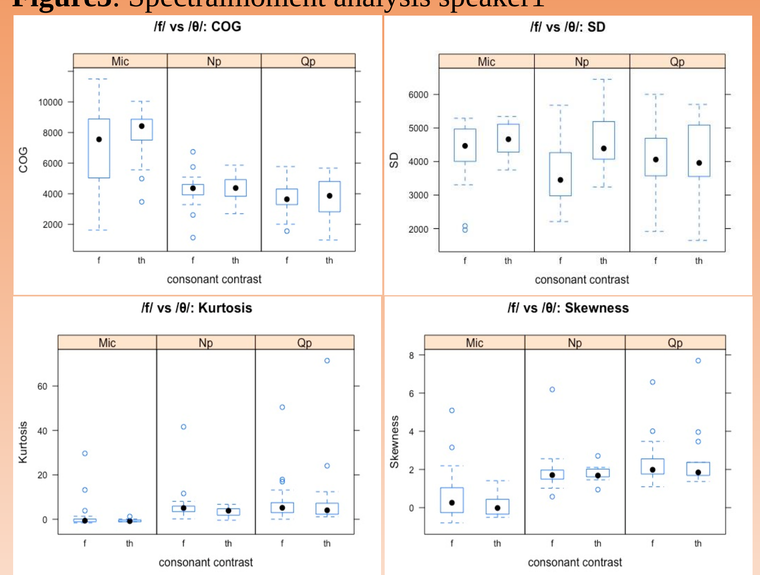
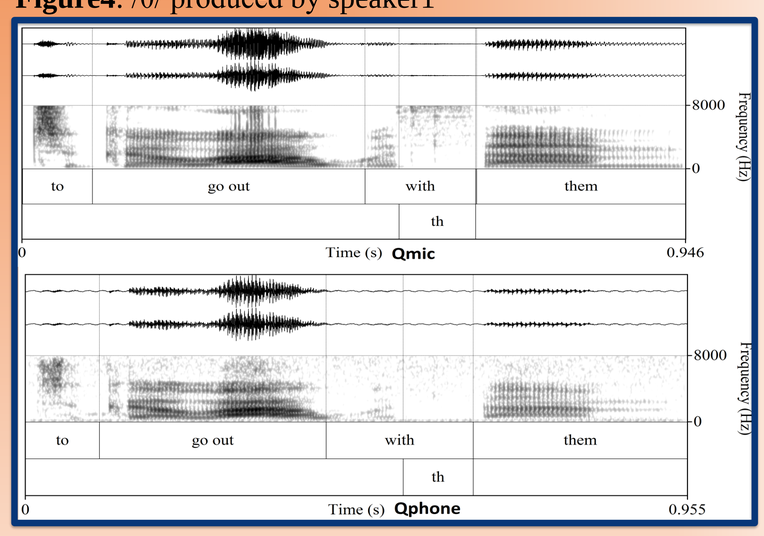


Figure4: /θ/ produced by speaker1



References

[1] Balamurali B T Nair, Esam A S Alzqhoul and Bernard J Guillemin. 2016. Impact of the GSM and CDMA Mobile Phone Networks on the Strength of Speech Evidence in Forensic Voice Comparison. Journal of Forensic Research. 7, 1-9 [2] Guillemin, B. J., Watson, C. 2008. Impact of the GSM mobile phone network on the speech signal: some preliminary findings. The International Journal of Speech, Language and the Law 15, 2, 193–218. [3] Byrne, Catherine and Foulkes, Paul. 2004. "The Mobile phone effect on vowel formants". The International Journal of Speech, Language and the Law 11(1), 83-102[4] Dan, Cudjoe. 2014. Review of generations and physics of cellphone technology. International Journal of Information Science, 4, 1 –7. [5] Künzel, H. J. 2001. Beware of the 'telephone effect': the influence of telephone transmission on the measurement of formant frequencies. Forensic Linguistics 8, 1, 80–99. [6] Boersma, P., Weenink, D. 1992-2017. Praat: doing phonetics by computer. 6.0.25.