Are Germans better haters than Danes? Language-specific implicit prosodies of types of hate speech and how they relate to perceived severity and societal rules

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Abstract

Hate speech, both written and spoken, is a growing source of concern as it often discriminates societal minorities for their national origin, sexual orientation, gender or disabilities. Despite its destructive power, hardly anything is known about whether there are cross-linguistic mechanisms and acoustic-phonetic characteristics of hate speech. For this reason, our experiment analyzes the implicit prosodies that are caused by written Twitter and Facebook hate-speech items and made phonetically "tangible" through a special, introspective reading-aloud task. We compare the elicited (implicit) prosodies of Danish and German speakers with respect to f0, intensity, HNR, and the Hammarberg index. While we found no evidence for a consistent hate-speech-specific prosody either within or between the two languages, our results show clear prosodic differences associated with types of hate speech and their targeted minority groups. Moreover, language-specific differences suggest that – compared to Danish – German hate speech sounds more expressive and hateful. Results are discussed regarding their implications for the perceived severity and the automatic flagging and deletion of hate-speech posts in social media.

Index Terms: hate speech, social media, German, Danish, implicit prosody.

1. Introduction

The importance of detecting and evaluating hate speech has been grown since its harmful effects increase worldwide [1,2]. For instance, German studies indicate that every third teenager between the age of 12 and 19 years has already experienced cyber bullying on social-media platforms [3,4]. More generally, negative effects of hate speech include lasting psychological damage to members of the targeted group (see also [5]), a breakdown in harmonious community relations, and a threat to law and order [6]. The Hutus, for instance, spread a flood of dehumanizing hate-speech messages in government and media to prepare their deadly attacks on the Tutsis in Rwanda in 1994. Also, the Third Reich used hate speech as a linguistic weapon against Jews to pave the way to the Holocaust [7].

Given the destructive power of hate speech and the danger of becoming a psychological victim of hate speech at a young age already, it is alarming how little is known about the phonetic characteristics of hate speech, particularly about prosody as the major vehicle of expression of emotions, attitudes, etc. related to hate speech [8]. Of course, the majority of what can be considered stereotypical hate speech nowadays occurs in written form. But, does this mean that there is no prosody?

About 20 years ago, Janet D. Fodor developed the seminal and established 'Implicit Prosody Hypothesis' stating that not only spoken utterances have a prosody [9]. Texts also inevitably create a prosody in the mind of the reader. Thus, posts as we find them on Twitter, Facebook, etc., including those containing hate speech, do have a prosody – or, more precisely, they have an implicit prosody. Studies suggest that reading-aloud tasks can, under certain conditions like prior training and sufficient familiarity with the text material, make implicit prosody audible [10]. We make use of this implicit-to-overt prosody conversion method here in order to measure, analyze, and compare the implicit prosodies of authentic hate speech posts.

Over and above social media, it has always been a challenge so far to draw a line between problematic content that is protected by freedom of speech and hate speech that must be deleted, flagged or prosecuted. Politicians and companies like Facebook define hate speech via the content of a post. Research in the field of speech technology or computational linguistics basically does the same, although more recent approaches also take into account some metadata of a post as well as its larger semantic-pragmatic context [11,12]. There are many clear cases for which this content-based approach works fairly reliably [12]. Yet, for a large grey area it falls short. What is missing is a supplementary reference to the perceived severity of hate speech posts. Implicit prosody can be a key to this perceived severity. For example, the utterance *"You are an ugly and stinky person"* would probably be considered hate speech. But, whether an utterance like *"You are a beautiful and nice person"* represents an instance of hate speech as well, or just a friendly compliment, depends entirely on the use of an ironic prosody [13,14]. A similar utterance type, also related to irony, is the rhetorical question: *"Isn't she a beautiful and nice person?"* could simply be an information-seeking question; or it could be a hateful hint to (assumed) common knowledge expressing that *"She is not a beautiful and nice person!"*. Again, it is the prosody that disambiguates the two interpretations [14].

Against this background, it is one aim of our XPEROHS project to examine the relevance of (implicit) prosody for defining and classifying and thus, ultimately, for (automatically) detecting and flagging hate speech across languages [15]. Our project focuses on the two Germanic languages German and Danish. They were selected for two reasons. First, Germany and Denmark are free, democratic countries and both located in the middle of the global 'Freedom-of-Thought Ranking' 2019 [16]. However, in balancing freedom of expression against the human rights of dignity and equality, Danish law is more tolerant of hate speech than German law. Probably the same applies to the two societies and their use of hate speech on social-media platforms. The XPEROHS project found overall more hate-speech posts in Danish than in German social media. Germans also show a special, historically rooted relationship to National Socialism and anti-Semitism, the Holocaust in particular. Holocaust

references are prominent in German hate speech but at the same time a very sensitive topic in German society. Neither applies to the same extent in Denmark. The second reason why the two languages were selected is that Danish and German prosodic phonologies differ considerably. Compared to German prosody, Danish prosody is more monotonous because Danish knows no pitch-accent variation and no high boundary tones, i.e. phrase-final rises [17]. Moreover, Danish prosody is less emotionally colored – or, to put it in the recent words of the Copenhagen Language Center: "Danes aren't exactly world famous for showing a lot of emotion" (see [18]).

On this basis, the research questions (RQ) addressed here are: **RQ1** Despite the differences between the two languages' prosodic phonologies, is there something like a basic prosodic pattern or a prosodic construction that is characteristic of hate speech in general; i.e., does hate speech represent a communicative function in its own right? **RQ2** Do German and Danish speakers add the same prosodic "soundtrack" to the same type of hate speech? Or, alternatively: **RQ3** Do these "soundtracks" dif-fer not only between hate-speech types, but also between the two languages? **RQ4** If so, is German or Danish hate speech prosodically more/less "hateful"?

Regarding RQ1, a previous study has already provided a preliminary answer for German [19]. Acoustic analyses of read aloud hate speech posts did not yield any supporting empirical evidence for the existence of a specific prosodic fingerprint that is consistent across all types of hate speech. In the present study, we extend this question to Danish. Additionally, we break down RQ1 from the level of hate speech in general to the level of its individual types and ask, in RQ2, whether characteristic acoustic-prosodic fingerprints emerge for these types of hate speech across the two prosodically very different languages. Answers to this question, in combination with answers to RQ3-4, finally provide indications as to how far legal and societal norms shape the prosody of hate speech, which, in turn, has implications for the perceived severity of types of hate speech in the two languages and countries.

2. Method

2.1. Original items and derived feature conditions

For each language, 12 hate-speech items were randomly selected from the XPEROHS corpus – a huge annotated collection of ~3.5 million authentic hate-speech items that were posted on Twitter and Facebook. About 1.7 million items were posted on German, the other half on Danish accounts. The selected 24 hate-speech items were of a similar length (i.e., less than 25 words, between 20-30 syllables) and concerned the minority group of immigrants. Half of the items targeted foreigners in general, the other half Muslims in particular.

Based on these 24 original hate-speech items, or ORIG items, six further types of hate-speech items were created for both languages. They are henceforth referred to as "feature conditions": irony (IRO), indirectness (IND), holocaust relation (HOL), imperative (IMP), figurative language (FGL), and rhetorical question (RQ). All six feature conditions were selected to provide representative coverage of the variation of hate speech in both languages. Thus, all six feature conditions represent major types of German and Danish hate speech, according to a typological analysis of our XPEROHS corpus.

 The six feature conditions were derived from each ORIG item by using the typical German/Danish (morpho)syntactic expressions that crystallized per condition in the XPEROHS corpus. These expressions were either attached to the beginning or the end of the respective ORIG item. For example, IRO items were created by prefixing phrases like "*I would NEVER say that...*" to each ORIG item. Prefixation was also used to create IND items by adding expressions like "*I have nothing against Muslims/foreigners, but ...*" before each ORIG item. In contrast, HOL items were derived from ORIG items by suffixing phrases like "*Throw them into a concentration camp!*" Similarly, IMP and RQ items were both created by suffixing phrases like "*Let us fight against them!*" and "*How would they know what work is?*" to each ORIG item. Overall, this resulted in 84 hate-speech items per language and 168 items in total. Note that all examples given above are translations from German/Danish originals.

2.2. Speakers

In our efforts to make the implicit prosody of the 168 final hate-speech items audible, the most difficult question was how to achieve representativeness and control. To that end, speech production studies typically use large speaker samples. This approach was not practical here, because our speakers had to meet a number of strict comparison criteria. Additionally, the important, intensive familiarization with the material, the task of internally monitoring and then reproducing one's own implicit prosodies requires a time-consuming practice phase.

We therefore opted for two carefully selected speakers, a German and a Danish native speaker. Both speakers have the same prosodic base profile. That is, in everyday dialogues of both speakers, there were no significant differences for any of the analyzed acoustic parameters (Table 1). This is rare, given the phonological differences between the two languages. However, comparable prosodic base profiles were essential for our study in order to rule out that different hate-speech prosodies were merely artifacts resulting from speaker-specific prosodies.

Table 1: *The two statistically identical prosodic base profiles of our selected German and Danish speakers (based on 10-minute recordings of everyday dialogues per speaker).*

Prosodic parameter	German	Danish
mean f0 level	119 Hz	124 Hz
mean f0 range	11.9 st	11.7 st
mean (RMS) int.	65.5 dB	64.9 dB
mean HNR	15.8 dB	16.5 dB
mean Hammarberg index	20.4 dB	20.2 dB

Both speakers also fulfilled the characteristics of the typical European hate speaker, i.e. Caucasian/white, male, and between 35-45 years old [20]. Furthermore, they were experienced speakers, for example, by dealing with students on a regular basis and by speaking regularly in front of an audience. Additionally, both speakers were trained and skilled in using their voice, including emotional prosodies and the observation-based imitation of prosodic patterns and dialects as a whole. Finally, both speakers served in the military for a period of time and were thus accustomed to using a rather harsh tone of voice.

2.3. Procedure

Prior to being recorded, both experienced speakers got the instruction to familiarize themselves thoroughly with the final 84 hate-speech items of their respective language and to practice the elicitation of all items with different phonetic realizations in order to find an authentic and natural one for each item. To that end, they received the reading material and then had several days of practicing time before the recording

session. The reading material used the same font type (and font size) for both speakers, see [21] and [22] for the effect of typeface on prosody in speech elicitation tasks.

To further facilitate the stimulus elicitation and the speaker's implicit-to-overt prosody conversion task during the recording sessions, the two speakers read each stimulus first silently and then aloud. Moreover, all stimuli of one feature condition were presented and read as a group to give the speakers the opportunity to delve deeply into the mood and form of expression of that particular type of hate speech, before they continued after a break with the stimulus group of the next feature condition. The reading order of stimulus groups was varied between the speakers, depending on their preferences.

The two speakers were recorded individually in a sound-attenuated booth with a high-end Microtech Gefell M940 microphone. Recorded speech signals were digitized at a 44.1 kHz sampling rate and a 16-bit quantization. The speakers did not vary the distance to the microphone during the recording session. Recordings took place during the same time of day and under the same light conditions for both speakers [23]. The speakers repeated every stimulus until they were satisfied with the correspondence between implicit and overt prosody as well as with the chosen prosody itself.

The final stimuli were played to native speakers of the respective language and to two phoneticians. The entire elicitation procedure was repeated and a new recording session was scheduled until all parties involved (including the speakers) confirmed the authentic and natural character of the stimuli.

2.4. Acoustic analysis

The acoustic-phonetic analysis was done automatically by using PRAAT scripts [24,25,26]. The analysis included the two pitch parameters pitch range (semitones, st) and mean pitch (Hz). Additionally, we analyzed the two voice-quality parameters mean Harmonics-to-Noise Ratio (HNR, dB) and Hammarberg index (dB). The latter two spectral measurements were taken within the frequency range of 75 Hz to 5 kHz. The participants' loudness was also analyzed in terms of mean RMS intensity (dB). These parameters were chosen because their association with emotions and expressivity has been well established by previous studies (e.g., [27,28]). Duration and tempo measures were not taken due to the varying morpho-syntactic make-up of the stimuli. For example, differences in stimulus length like those between ORIG items and other feature conditions would have introduced an inherent bias into tempo measurements, see [29]. Outliers were checked and corrected or excluded manually.

3. Results

We statistically analyzed the 84 recorded hate-speech items in each language with respect to pitch minimum and maximum, mean pitch, HNR, Hammarberg index, and intensity by using linear regression. That is, we compared the prosodic characteristics of different instances of the same type of hate speech across all feature conditions and across languages. All phonetic parameters listed above were dependent variables, whereas *language*, *feature condition*, and *target* were predictor variables; *p*-values were adjusted using the Benjamini-Hochberg correction in order to account for multiple testing [30].

Results for pitch range show an effect of *language* ($ß = 6.5$, $SE = 1.3$, $p < 0.0001$) with a larger pitch range for German as compared to Danish hate speech. For mean-pitch level, our

analysis yielded an interaction between *language* and *feature condition* ($ß = 19.2$, $SE = 2.4$, $p = 0.02$), with a higher mean pitch for German as compared to Danish hate speech for all items (all *p*-values < 0.03). Additionally, for the Danish subset, we found a lower mean-pitch in IND than in HOL items ($ß = -11.8$, $SE = 4.9$, $p < 0.02$), a higher mean-pitch in IRO than in HOL items ($ß = 11.1$, $SE = 4.9$, $p < 0.03$), and a higher mean-pitch in IRO than in IND, FGL, and ORIG items (all $p < 0.03$, see Figure 1). Furthermore, all Danish ORIG items differed significantly from IMP ($ß = 10.1$, $SE = 5.0$, $p = 0.04$), IRO ($ß = 17.5$, $SE = 4.9$, $p < 0.0007$) and RQ items ($ß = 11.9$, $SE = 5.0$, $p < 0.02$) by showing a lower mean-pitch level.
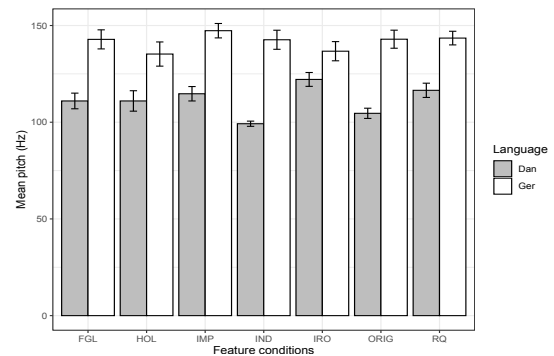

Figure 1: *Mean pitch (Hz) in all German and Danish feature conditions.*

For the voice quality parameter HNR, we found an effect of *language* ($ß = 0.5$, $SE = 0.2$, $p = 0.01$), caused by a higher HNR level for German than for Danish hate speech. Regarding the Hammarberg index, our analysis showed an effect of *language* ($ß = 4.1$, $SE = 0.3$, $p < 0.0001$) indicating a higher Hammarberg index for German than for Danish hate speech.

Finally, results for mean intensity showed an interaction between *language* and *target* (i.e., Muslims vs. foreigners; $ß = -3.0$, $SE = 0.8$, $p < 0.0005$) due to a lower mean intensity for Muslim- than for foreigner-directed hate-speech items in the German data set ($ß = -2.0$, $SE = 0.5$, $p < 0.0005$, Figure 2). Additionally, we found a higher mean intensity level for IMP than for HOL items in German ($ß = 3.7$, $SE = 1.0$, $p < 0.0006$). In contrast, the Danish items showed a higher mean intensity for items targeting Muslims rather than foreigners ($ß = 1.0$, $SE = 0.3$, $p < 0.006$, Figure 3). We also found a higher mean intensity in Danish HOL items as compared to IMP ($ß = -2.0$, $SE = 0.6$, $p = 0.002$), IND ($ß = -3.4$, $SE = 0.6$, $p < 0.0001$), FGL ($ß = -3.7$, $SE = 0.6$, $p < 0.0001$), RQ ($ß = -4.4$, $SE = 0.6$, $p < 0.0001$), and ORIG items ($ß = -5.2$, $SE = 0.6$, $p < 0.0001$).
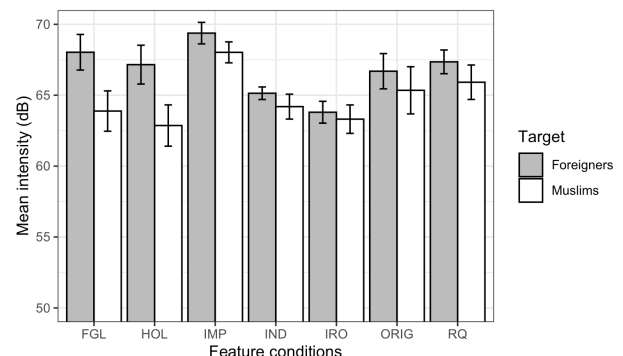

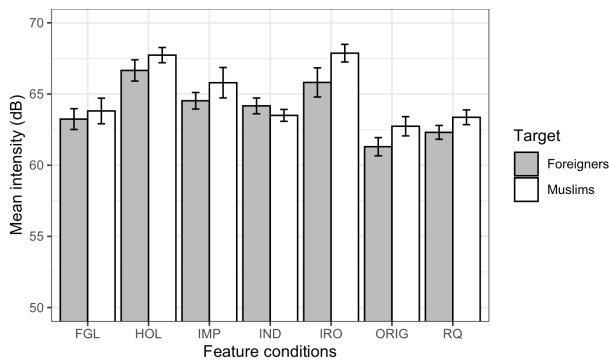Figure 2: *Mean intensity (dB) for German across all feature conditions.*

Figure 3: *Mean intensity (dB) for Danish across all feature conditions.*

4. Discussion

Our results are consistent with those of a previous study [19] in which we found no evidence for a specific prosodic fingerprint that generally characterizes hate speech in German. The new finding added by this study is that the same conclusion also applies to Danish. Hence, it seems that there is no separate form-function link for hate-speech prosody. German and Danish are both Germanic languages belonging to different language families (i.e. German: West Germanic vs. Danish: North Germanic). The fact that two only indirectly linked Germanic languages both lack a prosodic fingerprint of hate speech supports our assumption regarding **RQ1** that hate speech is not a communicative function or stylistic pattern in its own right, encoded in a specific prosodic form, perhaps in no language.

However, the lack of an overarching pattern does not mean that there are no hate-speech patterns at all. We found specific prosodies for each type of hate speech, but, in terms of **RQ2**, not in the form of cross-language "soundtracks". Rather, as is suggested by **RQ3**, both German and Danish apply separate "soundtracks" to each type of hate speech, additionally embedded in language-specific prosody settings. The language-specific prosody settings are such that German hate-speech items were realized with a larger pitch range and at a higher pitch level than Danish hate-speech items. Additionally, they were realized with less breathiness in German compared to Danish. Therefore, with respect to **RQ4,** our data suggest (in line with the authors' auditory impression) that German hate speech sounds overall more "hateful", emotional, expressive, and stronger compared to the rather restrained, uninvolved, compressed, and soft realization of Danish hate speech items. This matches with the higher Hammarberg index found for German hate speech items, indicating a higher level of expressivity compared to Danish. Note that this cannot merely be a speaker-specific artefact as the basic prosodic profiles of the German and Danish speakers were comparable for spontaneous speech and/or differed in opposite directions in spontaneous speech and hate speech.

The intensity measurements yielded more complex results within the language-specific patterns. While Danish HOL and IRO items showed the highest intensity level of all feature conditions, German IMP items elicited the highest intensity level. In contrast, both German HOL and IRO items showed a lower intensity level compared to the respective Danish items. The quieter German HOL items could reflect the historically rooted sensitivity to Holocaust utterances in Germany and the knowledge that the misuse of such utterances (as in hate speech) is a punishable offense. In Denmark, by contrast, such limitations do not exist.

Furthermore, German hate-speech prosody showed a lower intensity level when targeting Muslims than foreigners. The exact opposite was true for the Danish hate-speech prosody and again, the reasons for this could be found in society. While Denmark sees itself as an immigration country, but without traditionally strong Muslim immigration [31], the proportion of Muslim citizens in Germany is almost twice as high as in Denmark [32]. On the other hand, Germany is, unlike Denmark, generally rather skeptical about immigration. Against this background, it is plausible that hate speech in Germany is "louder" against foreigners in general than against Muslims in specific, and vice versa in Denmark. Another explanation might be that Germans tend to express cold rather than hot anger when Muslims are targeted and vice versa for Danes.

Taken together, we assume that the prosody of hate speech is constituted by the semantic-pragmatic make-up of the corresponding utterance (e.g., ironic prosody in the case of an ironic utterance, rhetorical-question prosody in the case of a rhetorical question, etc.), combined with reflexes of social and legal norms and concepts. In addition to that, note that the relative frequency of hate-speech posts in social media is higher in Denmark than in Germany. This suggests that while the legal framework could determine (and limit) the occurrence of hate speech, the implicit prosody of hate speech seems more strongly shaped by cultural and societal factors, such as prevailing societal attitudes towards the respective minorities and the cultural norms for openly displaying (negative) emotions. What the role of prosodic phonology is in shaping implicit hate-speech prosody is difficult to say based on our data. However, the fact that the within-language prosodic differences between types of hate speech were similarly large as the between-language differences (despite the lack of H% and pitch accents in Danish) suggests that phonological factors only play a minor role in shaping implicit hate-speech prosody.

Finally, the reason for eliciting and analyzing implicit prosody in the present study is the assumed link between implicit prosody and the perceived severity of read hate-speech posts. Our findings have two implications for this assumed link. First, verbal (lexical and (morpho)syntactic) factors are insufficient for estimating the perceived severity of hate-speech posts. The same type of hate speech, even expressed in almost the same words but posted in different language communities, can have a much more/less severe impact on its readers. Second, in order to estimate the perceived severity of a hate-speech post more precisely, one has to study the interplay of verbal with emotional, attitudinal, and normative factors, all of which are reflected in implicit prosody. That is, implicit prosody can be a tool to understand otherwise intangible factors of hate-speech evaluation. Thus, follow-up studies on the implicit prosody of hate speech across various types and languages will ultimately help politicians and other decision makers flag hate speech and prosecute it such that verdicts are not made across the board but match with the readers' perceived severity. To that end, we will record additional speakers and speakers of different languages in future recording sessions in order to contrastively analyze the implicit prosody of hate-speech items across languages.

5. Acknowledgements

6. References

[1] Council on foreign relations, "Hate Speech on Social Media: Global Comparisons," 2019, taken from: https://www.cfr.org/backgrounder/hate-speech-social-media-global-comparisons, last accessed 2020/05/08.

[2] A. Guterres, "United Nations Strategy and Plan of Action on Hate Speech," 2019, taken from: https://www.un.org/en/genocideprevention/documents/UN%20S trategy%20and%20Plan%20of%20Action%20on%20Hate%20S peech%2018%20June%20SYNOPSIS.pdf, last accessed 2020/05/12.

[3] Augsburger Allgemeine (dpa), "Jeder dritte Jugendliche Opfer von Cyber-Mobbing," 2020, taken from: https://www.augsburgerallgemeine.de/digital/Jeder-dritte-Jugendliche-Opfer-von-Cyber-Mobbing-id16521056.html, last accessed 2020/05/12.

[4] D. Willems, "Neue Kriminalisierungsrisiken? Zur Bedeutung des Internets für die Kriminalitätsprävention. Internet und Prävention," 2020, taken from: https://www.kriminalpraevention.de/files/1Forum-kriminalpraevention-webseite/pdf/2013-03/internet-und-praevention-1-3-2013.pdf, last accessed 2020/05/11.

[5] K. Gelber and L. McNamara, (2016), "Evidencing the harms of hate speech," *Social Identities*, vl. *22*, no. 3, pp. 324-341.

[6] J. Waldron, *The harm in hate speech*. Cambridge: Harvard University Press, 2012.

[7] R. Delgado and J. Stefancic, "Four observations about hate speech," *Wake Forest Law Review*, vol. 44, no. 2, pp. 353-370, 2009.

[8] R. Schwartz and M. D. Pell, "Emotional speech processing at the intersection of prosody and semantics," *PloS One,* vol. 7, no. 10, e47279. 2012.

[9] J. D. Fodor, "Prosodic disambiguation in silent reading," in *32nd North East Linguistics Society Meeting, Amherst, USA, Proceedings,* 2002, pp. 112–132.

[10] S. A. Jun, "The implicit prosody hypothesis and overt prosody in English," *Language and Cognitive Processes*, vol. 25, no. 7-9, 2010, pp. 1201-1233.

[11] S. MacAvaney, H.-R. Yao, E. Yang, K. Russell, N. Goharian and O. Frieder, "Hate speech detection: Challenges and solutions," *PloS One*, vol. 14, no. 8, e0221152, 2019.

[12] T. Davidson, D. Warmsley, M. Macy and I. Weber, "Automated hate speech detection and the problem of offensive language," in *11th international aaai conference on web and social media, Montreal, Canada, Proceedings*, 2017, pp. 512–515.

[13] O. Niebuhr, "A little more ironic – Voice quality and segmental reduction differences between sarcastic and neutral utterances," in *7th International Conference on Speech Prosody, Dublin, Ireland, Proceedings*, 2014, pp. 608-612.

[14] J. Neitsch and T. Marinis, "The prosodic Mapping of Irony in German Rhetorical Questions," in M. Elmentaler and O. Niebuhr (eds.): *An den Rändern der Sprache*, Kiel: CAU, in press.

[15] N. Baumgarten, E. Bick, K. Geyer, D. Lund Iversen, A. Kleene, A. V. Lindø, J. Neitsch, O. Niebuhr, R. Nielsen and E. N. Petersen, "Towards Balance and Boundaries in Public Discourse: Expressing and Perceiving Online Hate Speech (XPEROHS)," *RASK – International journal of language and communication,* vol. 50, pp. 87-108, 2019.

[16] The Freedom of Thought Report, "Ranking Index 2019", 2019, taken from: https://fot.humanists.international/ranking-index-2019/, last accessed 2020/05/10.

[17] N. Grønnum, "Intonation in Danish," in D. Hirst and A. di Cristo, (eds.): *Intonation systems: A survey of twenty languages*, Cambridge: University Press, pp. 131-151, 1998.

[18] Copenhagen Language Centerm, "Danish vocabulary for feelings and emotions," 2019, taken from: https://www.kbh-sprogcenter.dk/en/blog/danish-vocabulary-feelings-emotions/, last accessed 2020/05/08.

[19] J. Neitsch and O. Niebuhr, "Types of hate speech in German and their prosodic characteristics," in *1st International Seminar on the Foundations of Speech (SEFOS), Sonderborg, Denmark, Proceedings,* 2019, pp. 85-87.

[20] M. Hrdina, "Identity, activism and hatred: Hates peech against migrants on Facebook in the Czech Republic" in *Naše společnost*, vol. 14, no. 1, pp. 38-47, 2015.

[21] S. Berger, C. Marquard and O. Niebuhr, "INSPECTing read speech – How different typefaces affect speech prosody," in *8th International Conference on Speech Prosody, Boston, USA, Proceedings*, 2016, pp. 513-517.

[22] K. Scott and R. Jackson, "When EVERYTHING STANDS OUT, Nothing Does," in A. Piskorska (ed.): *Relevance Theory, Figuration, and Continuity in Pragmatics*, vol. 8, Amsterdam: John Benjamins, pp. 167-192, 2020.

[23] O. Niebuhr, and A. Michaud, "Speech data acquisition: the underestimated challenge," in *Kieler Arbeiten in Linguistik und Phonetik (KALIPHO)*, vol. 3, pp. 1-42, 2015.

[24] Y. Xu, "ProsodyPro – A Tool for Large-scale Systematic Prosody Analysis," in *Tools and Resources for the Analysis of Speech Prosody (TRASP), Aix-en-Provence, France, Proceedings*, 2013, pp. 7-10.

[25] N. H. De Jong and T. Wempe, "Praat script to detect syllable nuclei and measure speech rate automatically," *Behavior research methods*, vol. 41, no. 2, pp. 385-390, 2009.

[26] C. De Looze and D. Hirst, "Detecting changes in key and range for the automatic modelling and coding of intonation," in *4th International Conference on Speech Prosody, Campinas, Brazil, Proceedings*, 2008, pp. 6-9.

[27] K. R. Scherer, T. Johnstone and G. Klasmeyer, "Vocal expression of emotion," in R. J. Davidson, K. L. Scherer, H. H. Goldsmith (eds.): *Handbook of affective sciences*, Oxford: University Press, pp. 433-456, 2003.

[28] T. Bänziger and K. R. Scherer, "The role of intonation in emotional expressions," *Speech communication*, vol. 46, no. 3-4, 2005, pp. 252-267.

[29] S. Nakamura, H. Tsubaki, Y. Kondo, M. Nakano and Y. Sagisaka, "Tempo-normalized measurement and test set dependency in objective evaluation of English learners' timing characteristics," in *16th International Congress of Phonetic Sciences, Saarbrücken, Germany, Proceedings*, 2007, pp. 1733-1736.

[30] Y. Benjamini and Y. Hochberg, "Controlling the false discovery rate: a practical and powerful approach to multiple testing," in *Journal of the Royal Statistical Society*, Series B 57, pp. 289-300, 1995.

[31] The Local, "Denmark's immigration and emigration is mostly to and from Western countries," 2019, taken from: https://www.thelocal.dk/20191023/denmarks-immigration-and-emigration-is-mostly-to-and-from-western-countries, last accessed 2020/05/14.

[32] The Economist, "How restive are Europe's Muslims?" 2001, taken from: https://www.economist.com/europe/2001/10/18/how-restive-are-europes-muslims, last accessed 2020/05/14.