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Production of English vowel duration by multilingual speakers of Namibian English

Namibian English vowel durations

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Research Article

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Abstract

The aim of this study was to examine spoken Namibian English by investigating how multilingual Namibian speakers produce vowel durations in pre-lenis and pre-fortis positions, and how those vowel durations compare to British English vowel durations in the same words. In British English and most other English varieties, vowel duration is affected by the voicing of the following consonant, so that vowels preceding phonologically voiced consonants are longer (pre-lenis lengthening) and vowels preceding phonologically voiceless consonants are shorter (pre-fortis clipping). The production data was collected using orthographic stimuli that were monosyllabic English words with voiced and voiceless final consonants after the target vowels. The data were collected from 14 multilingual Namibian English speakers. The vowel durations produced by the speakers in pre-lenis and pre-fortis position were first compared to each other and then to those produced by nine British English speakers in an earlier study. The results showed that the pre-lenis vowels were clearly longer than the pre-fortis vowels, and there were no differences between Namibian and British English vowel durations in most of the tested words. The results offer new insights into the realization of vowel duration in pre-lenis and pre-fortis positions in Namibian English.

1. Introduction

Namibia is linguistically very diverse with around 30 different languages spoken across the country, most of which are indigenous Khoisan and Bantu languages and some of which are Germanic languages. The most common indigenous language in Namibia is Oshiwambo, which is a Bantu language spoken by 49 % of Namibian households (Norro 2022a). Ten of the local indigenous languages are school languages that can be used as modes of instruction in the first years of school, but, in the fourth grade, the mode of instruction changes to English (Norro 2021, 2022b). Since the country's independence in 1990, English has been the only official language of Namibia. Prior to the country's independence, English, Afrikaans and German were all official languages. Evidence of Namibian English (NamE) becoming its own variety among World Englishes has been increasingly discussed in recent years (Buschfeld and Kautzsch 2014; Schröder 2021; Schröder, Zähres, and Kautzsch 2021; Stell 2021b, 2022b). It has even been suggested that there might be several ethnically distinct varieties of NamE (Schröder and Zähres 2020; Schröder, Zähres, and Kautzsch 2020). However, recent studies by Stell (2021b, 2022b) found evidence that NamE speaking men tend to sound more L1-like than women, and that there is a prestige variety of Namibian English that is perceived as prestigious across ethnic boundaries. In addition, White Afrikaans English varieties spoken in Namibia seem to have strong commonalities with White South African English (WSAfE), while Baster and Black middle class NamE varieties show less WSAfE influence (Stell 2023). However, there is still relatively little research on the phonetic features of NamE compared to other World English varieties, and literature often focuses on Southern African Englishes or Bantu influenced Englishes, rather than NamE as its own variety (e.g. Nelson 2020).

2. Theoretical background

2.1 Duration of speech segments

Duration of individual speech segments varies naturally in all languages of the world, be it due to stress patterns, speech rate or the segment's position in the word. In these cases, segment duration is typically not directly related to the meanings of the words. The segmental and suprasegmental features that affect speech sound duration have been comprehensively discussed by Lehiste (1970), whose work shows that the duration of speech segments is not only connected to word and sentence stress or speech rate, but also articulation and segmental conditioning. For example, Lehiste (1970) states that the intrinsic duration of vowel segments is, to a certain degree, a phonetic universal. More specifically, the intrinsic duration of vowels correlates with the height of the tongue during articulation, so that, in the same environment and under the same conditions, high vowels are naturally shorter than low vowels. This phenomenon is related to the extent of articulatory movements involved in the production of vowels. According to Lehiste (1970), vowel duration can also be affected by the following segment, such as the manner and place of articulation of the following consonant. For example, in some languages, the preceding vowel is produced longer before a voiced consonant, and in others, vowels are shortest before bilabial consonants. The connection between manner of consonant articulation and vowel duration has been shown to be related to articulatory movements. The preceding vowel is longer in duration when the articulatory movement from vowel position to consonant position is greater.

In some languages, such as Finnish, Japanese and Estonian, segment duration is a primary feature that is used for differentiating between meanings of words, such as in the Finnish words /tuli/ - /tu:li/ - /tul:i/ (meaning *fire - wind - customs*). In these cases, segment duration is a phonological contrast, and the languages are typically known as quantity languages. The duration differences can be distinctive in either only vowels or consonants, or both, and they can be tied to other morphological features: in Estonian, for example, vowel duration is only distinctive in stressed syllables, whereas in Finnish and Japanese it is independent of other features (Isei–Jaakkola 2004; Meister, Nemoto, and Meister 2015). Speakers of quantity languages are typically better at distinguishing segment duration differences than speakers of languages with no such contrasts (e.g. Kirmse et al. 2008; Ylinen et al. 2005) and speaking a quantity language can assist in the perception of second language quantity differences as well (McAllister, Flege, and Piske 2002; Saloranta and Heikkola 2022).

2.2 Duration contrasts in Namibian languages

In indigenous Namibian languages, the role of duration contrasts is quite varied. The Khoisan language Khoekhoegowab is typically described as having the five short vowels /i, e, a, o, u/ and the five long vowels /i:, e:, a:, o:, u:/ (e.g. Cruttenden 1992) that form phonological duration contrasts, making it a quantity language. Fredericks (2013), however, suggests that vowel duration is in fact a secondary feature, and the actual phonological feature is tone, with certain tones always accompanied by phonetically longer vowels, and others with short vowels. In Bantu languages, such as the majority language Oshiwambo and other local languages spoken in Namibia, there existed a phonological vowel quantity difference in proto-Bantu (Odden 2015), but over time this difference has been retained in some languages and lost in others (e.g. Maddieson and Sands 2019). In contemporary Bantu languages, and similar to Khoekhoegowab, vowel length often interacts with tone, but its role can vary significantly both within and between languages (Ntihirageza 2001). In addition, Afrikaans, which is still widely spoken as a lingua franca in Namibia, has some variation in phonetic vowel durations as the vowel inventory includes long diphthongized vowels, true diphthongs and monophthongs (Stell 2021a). The study by Stell (2021a) shows that there is phonetic variation in how the long diphthongized vowels are realized in terms of vowel quality in different Namibian Afrikaans varieties.

2.3 Vowel duration in English

In English, vowel duration is affected by phenomena such as stress, word length, vowel quality and consonant voicing (Carley, Mees, and Collins 2018; Roach 2004; Wells 1990). The role and realization of vowel duration contrasts varies between different English varieties (see e.g. Hillenbrand 2003; Ratko, Proctor, and Cox 2023, for descriptions of Australian and Southern Michigan American English). Some studies on American English regional varieties have suggested that duration may have a contrastive function in differentiating between spectrally merged vowel categories, i.e. speakers who produce certain American English vowels with similar qualities might rely more heavily on durational cues in vowel categorization (Labov and Baranowski 2006; Wade 2017), but the evidence remains scarce.

British English Received Pronunciation (RP) is considered to have both long (i.e. tense) and short (i.e. lax) monophthong vowels, but the duration of the vowel is in fact secondary to the quality of the vowel segment (Roach 2004). In other words, the tense-lax vowel pairs of British English (/iː/-/ɪ/, /uː/-/ʊ/, /ɔː/-/ɒ/, /ɑː/-/ʌ/ and /ɜː/-/ə/) are primarily distinguished by their spectral differences, which are secondarily linked to duration. In other words, in British English, the tense vowel /iː/ is always long and the lax vowel /ɪ/ is always short (Carley et al. 2018; Roach 2004; Wells 1990), though research has shown that this tense-lax opposition has been neutralized in some other English varieties, such as Black South African English (see e.g. Van Rooy and Van Huyssteen 2000). However, the vowel durations of British English and other English varieties are most strongly affected by the phonological voicing of the following consonant, so that vowels preceding voiced lenis consonants in the same syllable are longer (pre-lenis lengthening) and vowels preceding voiceless fortis consonants are shorter (pre-fortis clipping) (Carley et al. 2018; Lehiste 1970; Wells 1990). In other words, the duration of the vowel codes the phonological

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voicing of the following consonant, and is not directly related to the phonetic realization of consonant voicing.

3. Research questions

The purpose of this study was to examine how vowel durations are produced in pre-lenis and pre-fortis positions in NamE, and how the NamE vowel durations relate to those of British English in the same monosyllabic words. This experiment aimed to answer the following research questions: First, are vowel durations produced differently by multilingual NamE speakers in pre-lenis and pre-fortis positions, i.e. does the phonological voicing of the following consonant affect vowel duration in NamE? Second, are vowel durations produced by NamE speakers in monosyllabic words with voiceless and voiced final consonants different or similar to those found in more widely spoken varieties of English, represented here by (Southern Standard) British English? The first hypothesis was that multilingual NamE speakers would produce vowel duration differences in the tested words, but that the vowel durations might not be strictly connected to the voicing of the following consonant due to the different speech sound duration patterns found in Bantu and Khoisan languages and the fact that English is spoken as an L2 by most multilingual Namibian speakers. The second hypothesis was that the vowel durations of NamE might differ from those of British English due to the multilingual background of the speakers and possible influence of the complicated vowel length phenomena found in some Khoisan and Bantu languages (Cruttenden 1992; Hubbard 1993; Maddieson and Sands 2019; Ntihirageza 2001; Odden 2015).

Though English spoken in Namibia has been studied increasingly in recent years (e.g. Schröder 2021; Schröder et al. 2020; Stell 2021b, 2022a), more research on the phonetic features of NamE is needed in order to discover how the English spoken in Namibia relates to other World English varieties. Therefore, the aim of this study is to shed some light on NamE phonetics by investigating how English vowel durations are realized in multilingual Namibian speakers' speech. The same experiment procedure has been used in a previous study with adults who spoke British English as a first (L1) or second (L2) language (Peltola, Lintunen, and Tamminen 2014). The duration data obtained from the L1 British English speakers was used as a reference for the NamE vowel durations recorded in the current study. We do not mean to infer that NamE phonology is directly affected by BrE; the BrE data only serves as phonetic reference, as it is a phonetically well researched English variety that follows the common pre-lenis lengthening and pre-fortis clipping patterns to code the phonological voicing of the following consonant.

4. Materials and methods

4.1 Participants

Fourteen volunteers participated in the experiment (aged 21–25 years, mean age 22.1, nine females). All the participants were students or staff members at the University of Namibia in Windhoek. They all had learned English at three to seven years of age and spoke it daily. The participants' reported first languages (L1) were Khoekhoegowab (four speakers), Oshiwambo (four speakers, two of whom were born in the North and two on the West coast of Namibia), Otjiherero (four speakers), Rukwangali (one speaker) and Subiya (one speaker). One L1 Otjiherero speaker and one L1 Oshiwambo speaker reported English as their strongest language, but since they had learned English at the ages of three and six outside of home and after their first languages, they were not considered L1 speakers of English. The speakers also reported knowing Afrikaans (nine speakers), Portuguese (one speaker), Spanish (one speaker) and Silozi (one speaker), none of which were spoken as an L1 by the participants. The nine participants who reported knowing Afrikaans spoke it fluently and used it frequently with friends. The two participants who mentioned Portuguese and Spanish in the language questionnaire specified that they only knew some of the basics, and they did not use the languages actively. All participants reported knowing one to four languages in addition to English. The speakers of this study represent highly educated NamE speakers from various L1 backgrounds, who use English daily in their studies and/or work.

4.2 Stimuli and procedure

The stimuli were 20 monosyllabic English words with voiceless /t/ (fortis, 10 words) or voiced /d/ (lenis, ten words) final consonants (Table 1). These stimulus words were selected, because the aim of the experiment was to investigate whether the voicing of the final consonant would affect the duration of the preceding vowel. The same English words were used in two previous studies as orthographic stimuli with L1 and L2 British English speaking adults (Peltola et al. 2014) and as auditory stimuli with L2 British English speaking children (Immonen and Peltola 2018) to investigate English vowel quality and quantity production. The words were originally chosen because in British English, they typically include the tense vowels /iː/, /uː/, /ɔː/, /ɑː/, the lax vowels /ɪ/, /ʊ/, /ɒ/, /ʌ/, and the vowel phonemes /e/ and /æ/, allowing for the examination of both the tense-lax and the lenis-fortis duration variation. In addition, any possible effects of stress or place of consonant articulation on vowel duration (Lehiste 1970) were

Table 1. The 20 stimulus words used in the experiment

Fortis	heat	hit	bet	hat	foot	hoot	bought	hut	tot	heart
Lenis	heed	hid	bed	had	hood	who'd	board	hud	Todd	hard

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minimized by using isolated monosyllabic stimulus words with alveolar stops /t/ and /d/ as final consonants.

The stimuli were presented visually in their orthographic form using a PowerPoint Presentation running on a Dell Latitude 5320 laptop computer. Each of the 20 words was presented three times during the experiment, resulting in 60 words in total. The stimuli appeared automatically on the screen with an inter-stimulus interval (ISI) of three seconds after the participant started the experiment. The stimulus order was semi-randomised to ensure that none of the words appeared twice in a row during the experiment. The experiment took about five minutes including one self-paced break. The participants' productions were recorded using Sanako Study Recorder software and a Beyerdynamic MMX300 headset microphone connected to a Deltaco UAC-03 soundcard.

4.3 Analysis

The participants' productions were acoustically analyzed using Praat (version 6.2.20) (Boersma and Weenink 2022). The vowel durations (in milliseconds, ms) were extracted by segmenting the words and setting the CV segment boundary immediately after initial plosive explosion or the beginning of voicing in words with initial fricatives /h/ or /f/. The end of the vowel segment, i.e. the following VC segment boundary, was set at the beginning of the occlusion. In cases of vowel rhoticity (e.g., in words *hard*, *heart or board*), the utterance was excluded from the analysis. Rhoticity was only present in individual productions and not produced consistently by any of the speakers. However, two speakers produced rhoticity in all three productions of *heart* and *hard* (but not *board)*, and for this reason data from only 12 speakers were included in the analysis for the words *heart* and *hard*. Individual average vowel durations for each word were calculated from the values extracted from the three repetitions produced during testing. The average vowel durations were first examined separately to get an overall understanding of the vowel quantities produced by the NamE speakers in the tested words. Average duration ratios were also calculated by dividing the pre-lenis duration values by the pre-fortis duration values to see whether the pre-lenis vowels were produced longer than the pre-fortis vowels.

The average vowel durations obtained during the acoustic analysis were then statistically analyzed using the SPSS Statistics (version 27.0.1.0) software. First, the NamE speakers' productions were analyzed by comparing the average vowel durations in pre-lenis and pre-fortis positions with paired samples t-tests (Table 2), to see whether the durations were produced differently before voiced and voiceless consonants. The average NamE vowel durations were then compared to the durations produced by nine L1 British English (BrE) speakers (Southern Standard British English, SSBE) in a previous study (Peltola et al. 2014) by subjecting them to a one-way ANOVA (Group [2]: NamE vs. BrE). The purpose of the ANOVA was to see whether the NamE vowel durations differed from those of BrE in the same monosyllabic words.

5. Results

Results of the acoustic analysis (Figures 1 and 2) show that the average vowel durations produced by the participants ranged between 102–178 ms in the words with a fortis final consonant and between 136–242 ms in the words with a lenis final consonant. The longest vowel durations were produced for the word *who'd* (242 ms) and the shortest for *hit* (102 ms). Examination of the average vowel durations revealed that, overall, the vowels were produced shorter in a pre-fortis position in all ten word pairs. In other words, the NamE speakers produced shorter vowel durations in the ten words with a voiceless final consonant than in the words with a voiced final consonant, which could be an indication of some level of pre-fortis clipping and/or pre-lenis lengthening. This finding is further demonstrated by the duration ratios between the vowels in lenis and fortis words (Figure 3). When the ratio is over 1, the pre-lenis vowel was produced longer, which was the case in all ten word pairs. The higher the ratio, the longer the pre-lenis vowel

Table 2. Results of the paired samples t-tests comparing the average pre-fortis and pre-lenis vowel (V) durations

Word pair	Pre-fortis V (ms)	Pre-lenis V (ms)	Paired samples t-tests	Cohen's d
HEAT - HEED	124	231	$t(13) = 6.745$, $p < .001$	1.803
HIT - HID	102	136	$t(13) = 4.316$, $p = .001$	1.153
BET - BED	132	174	$t(13) = -5.43$, $p < .001$	1.451
HAT - HAD	136	223	$t(13) = 5.321$, $p < .001$	1.422
FOOT - HOOD	110	176	$t(13) = 4.921$, $p < .001$	1.315
HOOT - WHO'D	134	242	$t(13) = -5.79$, $p < .001$	1.548
BOUGHT - BOARD	178	272	$t(13) = 4.592$, $p = .001$	1.227
HUT - HUD	117	151	$t(13) = 6.702$, $p < .001$	1.791
TOT - TODD	126	174	$t(13) = 5.328$, $p < .001$	1.424
HEART - HARD	185	240	$t(13) = 4.063$, $p = .002$	1.173

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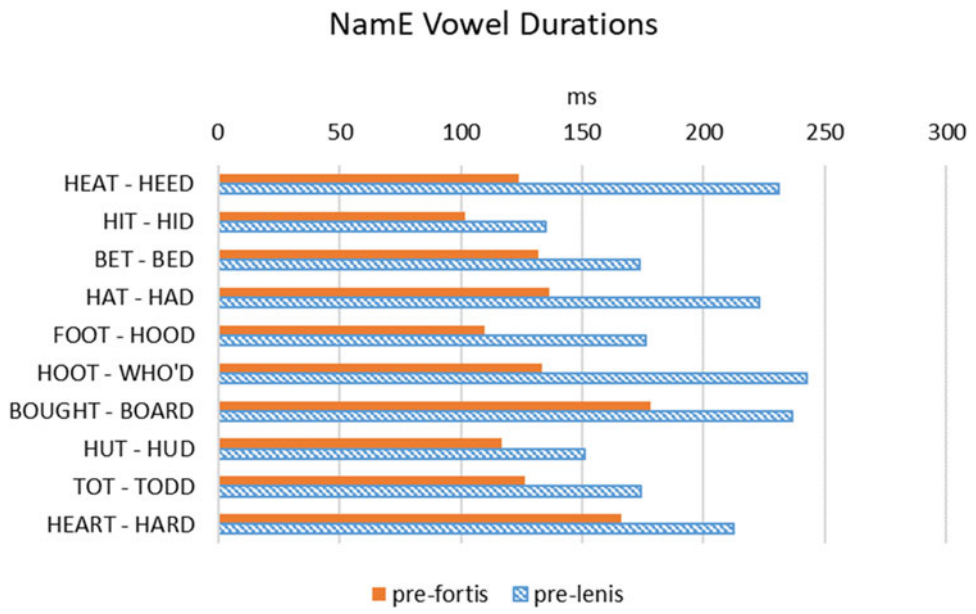

Figure 1. The average NamE vowel durations produced by the participants in pre-lenis and pre-fortis positions.

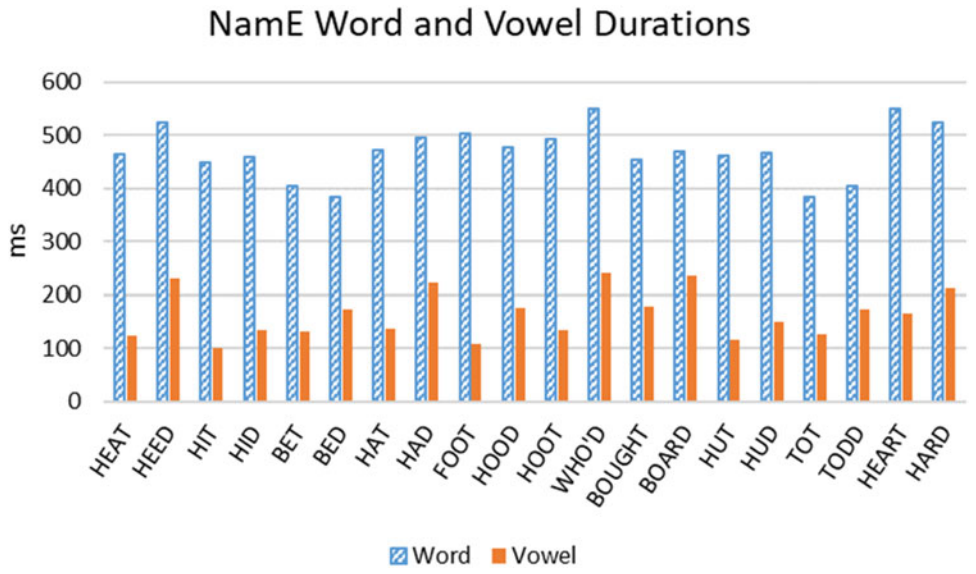

Figure 2. The average NamE word and vowel durations produced by the participants.

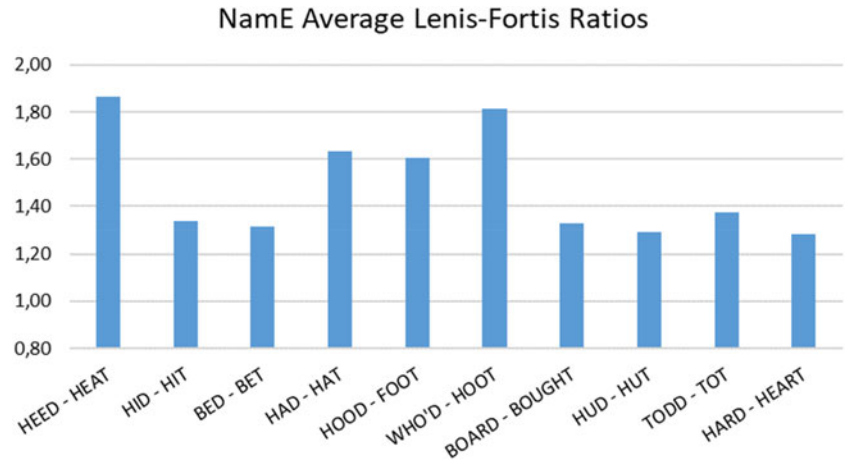

Figure 3. The NamE vowel duration ratios in lenis and fortis words.

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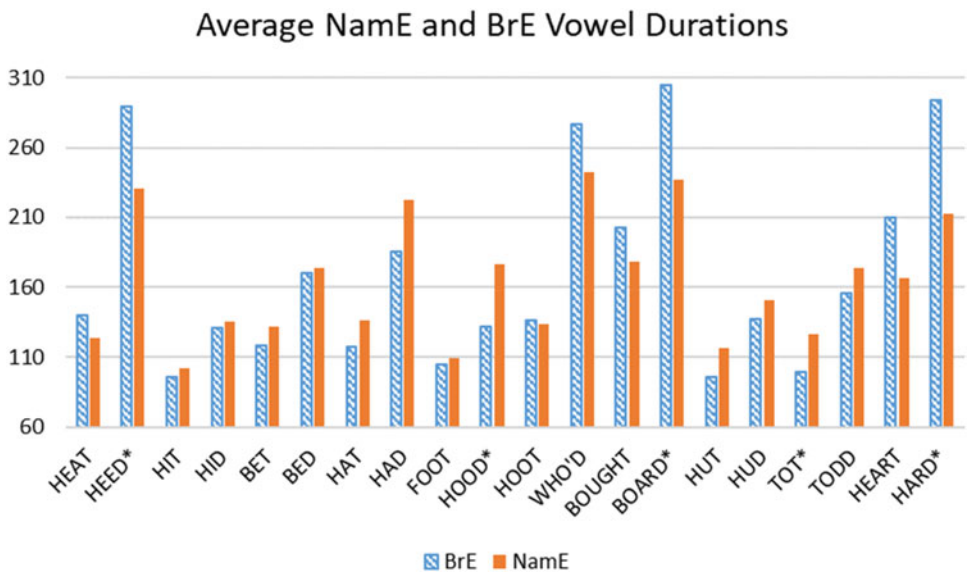

Figure 4. The average NamE (N = 14) and BrE (N = 9) vowel durations in the 20 tested words.

was compared to the pre-fortis vowel. The ratio was especially high in the word pairs *heed-heat* (1.87) and *who'd-hoot* (1.81), whereas the ratio was the lowest for the word pairs *hud-hut* (1.29), *hard-heart* (1.28), *bed-bet* (1.32), *hid-hit* (1.33), *board-bought* (1.33) and *Todd-tot* (1.38).

To further examine the pre-lenis and pre-fortis vowel durations produced by the NamE speakers, the average duration values before voiced and voiceless consonants were compared with paired samples t-tests. The analysis revealed significant differences in vowel duration between all ten fortis vs. lenis word pairs (Table 2).

Next, the average vowel durations produced by the NamE speakers were viewed together with the duration values produced by the nine BrE speakers tested in Peltola et al. (2014). The average duration values from both groups are displayed in Figure 4. Examination of the groups' vowel durations revealed similar production patterns for five words: *hit* (NamE 102 ms vs. BrE 96 ms), *hid* (136 vs. 131 ms), *bed* (174 vs. 170 ms), *foot* (110 vs. 105 ms) and *hoot* (134 vs. 137 ms). However, there seemed to be some differences in the production of other words. For example, the vowel durations produced by the British English speakers were longer in seven words: *heat* (124 vs. 140 ms), *heed* (231 vs. 289 ms), *who'd* (242 vs. 277 ms), *bought* (178 vs. 202 ms), *board* (237 ms vs. 304 ms), *heart* (166 vs. 210 ms) and *hard* (212 vs. 294 ms). Conversely, the NamE speakers produced longer vowels in eight words: *bet* (132 vs. 118 ms), *hat* (136 vs. 117 ms), *had* (223 vs. 186 ms), *hood* (176 vs. 132 ms), *hut* (117 vs. 96 ms), *hud* (151 vs. 138 ms), *tot* (126 vs. 100 ms) and *Todd* (174 vs. 156 ms).

The duration values from both groups were subjected to statistical analysis by using a one-way ANOVA (Group(2): NamE vs. BrE) to explore whether the durations produced by the NamE speakers in the tested words differed from those produced by the BrE speakers. The analysis revealed that the two groups' vowel durations differed significantly in the words *heed* ($F(1, 21) = 4.549$, $p = .045$; $\eta^2 = .178$), *hood* ($F(1, 21) = 6.311$, $p = .020$; $\eta^2 = .231$), *tot* ($F(1, 21) = 6.925$, $p = .016$; $\eta^2 = .248$), *board* ($F(1, 21) = 11.897$, $p = .002$; $\eta^2 = .362$) and *hard* ($F(1, 19) = 11.884$, $p = .003$; $\eta^2 = .385$). No other significant findings emerged.

6. Discussion

This study examined the production of vowel duration by multilingual NamE speakers in monosyllabic words. The orthographic stimuli were 20 CVC English words, ten of which had lenis final consonants and ten had fortis final consonants. The aim was to see whether NamE speakers' productions show evidence of pre-lenis lengthening and pre-fortis clipping, as is the case in BrE and other English varieties (Carley et al. 2018; Wells 1990). There were two research questions: Are vowel durations produced differently by multilingual NamE speakers in pre-lenis and pre-fortis positions? And, do vowel durations produced by multilingual NamE speakers differ from BrE in the same words? We expected that the NamE speakers would produce vowel duration differences, but that the vowel durations would not necessarily be connected to the phonological voicing of the following consonant. We further hypothesized that the vowel durations of NamE would differ from those of BrE.

The results of the acoustic and statistical analyses only partly confirmed our hypotheses. Paired samples t-tests confirmed our hypothesis that the NamE speakers would produce clear differences in vowel duration between the words. Moreover, the speakers produced systematically longer vowel durations for the lenis words than for the fortis words, indicating clear pre-lenis lengthening and/or pre-fortis clipping. However, the results showed that there were more commonalities and less significant differences between the NamE and BrE speakers' vowel durations than we expected. Significant differences between the groups were found in the words *heed*, *hood, board, hard* and *tot*, so that the NamE speakers produced significantly longer

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vowel durations for *heed, board and hard,* and shorter durations for *hood* and *tot*. However, despite the small differences observed in the other duration values after acoustic analysis, no other statistically significant differences were found between the groups, suggesting similar vowel duration production patterns in the 15 remaining stimulus words. Contrary to Stell (2022b) and predictions of Labov's (2001) gender paradox, we found no gender-related differences in the data during analysis.

The main result of this study was that the NamE speakers produced consistent and clear duration contrasts between the pre-lenis and pre-fortis vowels, and that pre-lenis vowels were significantly longer in all ten word pairs, which is in keeping with the vowel duration patterns found in other English varieties (e.g. Carley et al. 2018; Lehiste 1970; Wells 1990). This could indicate that, since English is spoken by a linguistically heterogeneous population in Namibia, speakers from different L1 backgrounds have retained the phonological coding of consonant voicing in the preceding vowel's duration, which is typical for many other English varieties, such as British English. In other words, NamE vowel duration in pre-lenis and pre-fortis positions might not be as strongly affected by Namibian L1s as we expected. This does not mean that L1 related influences are not present in other NamE features; in fact there is evidence of Bantu, Khoisan and Afrikaans influences (e.g. Schröder 2021; Stell 2023) on NamE vowel qualities. Another possible explanation for our findings is that the NamE vowel durations produced by the multilingual speakers in this study actually might have influences from the Bantu and Khoisan languages spoken in Namibia, many of which have or have had at least some degree of segmental duration variation (Cruttenden 1992; Maddieson and Sands 2019; Ntihirageza 2001; Odden 2015). It could be expected that the durational variation linked to pre-fortis clipping and pre-lenis lengthening is perceptually salient to speakers who have vowel duration contrasts in their other (first) languages, and therefore the contrast is also preserved and systematically produced in English. In terms of the Founder Principle (Mufwene 2001), which has also been discussed in terms of NamE by Stell (2021b), the presence of the pre-lenis and pre-fortis distinction in this data could indicate either a strong gravitational pull of an existing English variety with the same distinction, or a strong gravitational pull of Bantu and/or Khoisan languages. Both of these scenarios could explain the consistent NamE pre-lenis lengthening and pre-fortis clipping found in this study.

The fact that the NamE and BrE speakers' productions differed in vowel duration in only the words *heed*, *hood, board, hard* and *tot* indicates that, mostly, the NamE speakers produced similar tense and lax vowel durations to BrE speakers. Since in BrE tense vowels are long and lax vowels are short (Roach 2004), the similarities found in this experiment suggest that the NamE speakers followed the same duration contrast patterns in the remaining 17 stimulus words, where no significant differences between the groups were discovered. In addition, despite their statistical significance, the vowel duration differences between the group averages in the words *heed* (58 ms), *hood* (44 ms), *board* (67 ms), *hard* (82 ms) and *tot* (26 ms) were relatively small (Figure 4). Combined with the result that the speakers produced clear pre-lenis lengthening and pre-fortis clipping, these findings indicate that the vowel duration patterns of NamE are unexpectedly similar with known English duration patterns. Previous research has suggested, that due to the simpler five to seven vowel systems of Bantu and Khoisan languages, the spectral tense-lax vowel contrasts have been eliminated in NamE (see e.g. Schröder 2021, for evidence of the FLEECE-KIT merger in Bantu speakers and the GOOSE-FOOT merger). On the other hand, research has shown that the duration contrast related to the tense-lax opposition has been neutralized in Black South African English (see e.g. Van Rooy and Van Huyssteen 2000). Therefore, one explanation to our findings could be that, opposite to the neutralization of the tense-lax duration contrast found in Black South African English, the originally secondary duration contrast between the English tense and lax vowel pairs might have become the primary cue between the tense and lax vowels in NamE. However, as the vowel qualities of the NamE speakers' productions were not analyzed in this experiment, no further conclusions on the realization of tense-lax vowel contrasts in NamE can be drawn without further analyses. In order to gain a better understanding on the role of segment duration in NamE speech, further research on vowel quality as well as consonant duration and voicing needs to be conducted to complement the findings of this study.

There are some limitations to this study which might affect the interpretation and impact of the results. The sample is very heterogeneous, with multilingual speakers of different Namibian L1s and L2s. However, as speakers of NamE are mostly multilingual and English is spoken as a lingua franca between speakers of different L1s, the participants of this study represent a small sample of the linguistic realities of Namibia and the linguistic context in which Namibian English is spoken. Nevertheless, for a more detailed examination of possible L1 related differences in the production of NamE vowel duration, further research with more homogenous L1 groups is required. Some individual speakers produced rhoticity in some words, but none of them produced it systematically and the rhotic vowels were excluded from analysis. Since rhoticity was found in only some individual repetitions, it is unlikely to affect the results to a great extent, but further investigations into the production of rhoticity in NamE needs to be conducted in the future. Since the stimulus words were monosyllabic and presented in isolation with a controlled inter-stimulus interval of three seconds and without carrier sentences, any significant effects of word or sentence stress or speech rate on the observed vowel durations are unlikely. In addition, the final consonants /t/ and /d/ have the same place of articulation, controlling for any possible effects of place of consonant articulation on the preceding vowel's duration (Lehiste 1970). Future research with different stimulus words needs to be conducted to verify the results of this study and account for possible effects of e.g. word familiarity and syllable-timing.

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The results offer new insights into the realization of vowel duration in pre-lenis and pre-fortis positions in multilingual speakers' NamE, but more in depth analysis of possible L1 related influences on NamE vowel duration production fall outside the scope of this study. Previous studies have suggested that there might be at least two or more L1 dependent sub-varieties of NamE rather than one common variety (Schröder 2021; Schröder et al. 2020; Schröder and Zähres 2020). However, comparison of possible NamE sub-varieties would require larger groups of speakers from the same linguistic background. More data from different L1 NamE groups, and especially data from the Oshiwambo speaking Namibian majority, is needed in the future to make more definite conclusions on the vowel durations of NamE.

7. Conclusions

The results of this study showed clear differences between pre-lenis and pre-fortis vowel durations in Namibian English. The pre-lenis vowels were produced systematically longer than the pre-fortis vowels, indicating clear pre-lenis lengthening and/or pre-fortis clipping phenomena in Namibian English. This is keeping with the known vowel duration patterns found in English in general. The results revealed no differences between Namibian and British English vowel durations in most of the tested words, indicating similar vowel duration production patterns. The results offer valuable first insights into the role of vowel duration in the phonology of Namibian English. More data on the vowel qualities and consonant duration and voicing need to be gathered in the future in order to draw a more comprehensive picture of the phonetic realization of sound quality and quantity in Namibian English.

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