THE PERCEPTION OF FAMILIAR AND UNFAMILAR ACCENTS BY BILINGUAL AND MONOLINGUAL CHILDREN

Kathleen M. McCarthy[1], Bronwen G. Evans[2]

[1]Linguistics, Queen Mary University of London, [2]Speech, Hearing and Phonetic Sciences, University College London

k.mccarthy@qmul.ac.uk, bronwen.evans@ucl.ac.uk

ABSTRACT

In large urban cities, children typically grow-up in a diverse multicultural environment. Depending on their local language environment, children are often exposed to regional as well as foreign-accents. This study investigated whether children's accent processing is affected by the variability in their ambient language environment.

English monolingual and Sylheti-English bilingual children were assessed on their ability to identify sentences in three accent conditions: London-English (familiar to all), Sylheti-accented English (only familiar to the bilinguals), Spanish-accented English (unfamiliar to all). All children were most accurate in the London-English accent condition, however the groups differed with their dominant familiar accent: the monolinguals were more accurate at recalling the London-English sentences than the bilinguals, and the bilinguals were more accurate in the Sylheti-accented condition than the monolinguals.

The results suggest that variation in linguistic experience in early life, give rise to differences in the processing of familiar and unfamiliar accented speech.

Keywords: accented speech, sequential bilinguals, speech perception, word recognition.

1. INTRODUCTION

Within large urban centres, such as London, U.K., children are often exposed to more than one language as well as different regional and foreign accents. Within the same city, however, children can have vastly different linguistic experiences. For example, in some London boroughs, native monolingual children primarily encounter their local variety of English e.g., Multicultural London English [MLE; 8] as well as some foreign-accented speech. Yet, in neighbouring boroughs, there are dense immigrant communities where bilingual children will be exposed to their heritage language as well as heritage-language-accented varieties of the host country's language [23]. In turn, when these children start school, their immediate language environment will not only include an additional language but also different varieties of the host country's language, some of which may be unfamiliar. In order to communicate effectively, these children must learn to deal with this variation. To date, we know very little about this process, with the majority of research being on adults, and research with children mainly focussing on monolinguals [6, 7, 28, 29].

Research with adults has shown that accented speech, both regional and foreign, affects the speed and accuracy of processing [10, for a review]. Listeners have been shown to be slower at lexical decision tasks [14] and evaluating whether a sentence is true or false [1], and less accurate at transcribing an unfamiliar accent [16]. These effects have been shown to be exaggerated in background noise [9]. With exposure, however, adults are able to adapt to an unfamiliar accent [1, 27]. For example, British English speakers who had lived in the US were better at processing American English speakers' flapped medial /t/ productions [ɾ], e.g., in *city*, where they would typically have [t], than those who had not [27].

What work there is with children suggests that the ability to adapt to and/or use variation in speech processing develops relatively late. For example, although infants and young children are able to categorize talkers according their accent, they can only do this when the differences are large, i.e., home vs. foreign-accented speech [12, 13, 17, 27]. Likewise, adult-like accuracy with accented speech in quiet and noise seems to develop slowly, only emerging in late adolescence [4, 25].

However, recent research suggests that the immediate language environment also plays a role in how and when children develop the ability to deal with variation. For example, young children have been shown to be better at recognizing different accents when they have one parent with a regional accent that is different from the home community [17], and those with more experience with regionally-accented speech have been found to be better at adapting to an unfamiliar regional, but not foreign-accented speech [19]. Likewise, those growing up multilingually in a diverse, urban community where they were exposed to a lot of talker and accent variation were better able to categorize speakers according to their accent than their monolingual peers

[12]. This suggests that more varied input can lead to more sophisticated accent processing earlier in development, perhaps because children had not only developed the ability to track acoustic-phonetic differences between talkers, but had also developed an understanding of how patterns of variation were used meaningfully within their community [12].

The current study further explores the role of variation in children's language environment on their ability to comprehend accented speech in quiet and noise. Specifically, we investigated whether being exposed to a heritage language as well as heritage-language-accented varieties of the host country's language gives rise to better processing accuracy with familiar and unfamiliar accented speech. To do so, we tested two groups of inner London children: Sylheti-English sequential bilinguals from the Bangladeshi community in the London borough of Tower Hamlets, and monolingual English children from the London borough of Islington. Given the multilingual and multidialectal nature of London, all children had been exposed to regional and foreign accented varieties of English. The bilinguals, however, are from a more homogeneous community, in that the local population are primarily Bangladeshi heritage. The dominant foreign accent for these children will therefore be Sylheti-accented English of different levels, i.e., depending on the speaker, first-generation grandparent vs. second-generation sibling, for example [22]. These children will likely have to navigate Sylheti-accented English in the home and community, as well as varieties of London English, including MLE and Popular London [8, 30]. The English monolinguals, although likely exposed to some foreign accents, will be exposed predominantly to varieties of London English in the home and local community, with the predominant variety within this particular community being Popular London.

2. METHOD

2.1. Participants

Participants were fifty-six 6-7 year-old children from inner London (29 Sylheti-English sequential bilinguals, 27 monolingual English). The Sylheti-English bilinguals were from the London borough of Tower Hamlets. The monolingual English children resided in the London borough of Islington with no previous exposure to Sylheti or Sylheti-accented English. All children had no previous exposure to Spanish or Spanish-accented English. All children passed a hearing screen and had no reported speech and language delay. To minimise the influence of lexical knowledge on the speech perception task, the bilinguals and monolinguals were matched for English receptive vocabulary using the British Picture Vocabulary Scale [11].

2.2. Stimuli

Ninety-six sentences from the Bamford-Kowal-Bench sentence list [3] were selected and recorded by two female speakers per accent: Popular London, Sylheti-accented English, and Spanish-accented English (6 speakers in total). Each sentence contained 3 key words e.g., "The *house* had *nine rooms*" with 32 sentences selected for presentation in each accent. Sentences were selected to contain 2-4 instances of key segmental features for the given accent. For example, the London accent contained instances of /l/ vocalisation, the Sylheti accent contained clear /l/, and the Spanish accent contained instances of trilled /r/. The London accent was familiar to all children, the Sylheti accent was only familiar to the bilingual children, and the Spanish accent was unfamiliar to both groups, but contained similar accent features to the Sylheti accent e.g., FLEECE, /i:/ and KIT, /ɪ/, were merged such that they were both produced with the same vowel, /i/.

2.3. Procedure

Children were presented with sentences, blocked for accent and noise, resulting in six conditions: Popular London in quiet, Popular London in noise, Sylheti-accented in quiet, Sylheti-accented in noise, Spanish-accented in quiet, and Spanish-accented in noise. For the noise condition, sentences were embedded in speech-shaped noise at 0dB. The order of the blocks was counterbalanced across participants, and the order of presentation of the stimuli was randomized within and between each condition. This gave 16 sentences per condition (48 key words), with 8 sentences randomly assigned to each of the 2 talkers.

Children were tested individually in a quiet room in school. Sentences were presented over headphones (Sennheiser HD 25) at approximately 67 dB via a Macbook, using a custom-designed experimental interface running in Matlab [20]. Children were instructed to repeat the sentences they heard and encouraged to guess if they were unsure. They only heard each sentence once and were not given any feedback. The experimenter recorded keyword accuracy via the experimental interface.

2.4. Analysis

The children's keyword accuracy for each accent (Popular London, Sylheti-accented, Spanish-accented) in each condition (quiet, noise) was calculated in terms of number of key words correct.

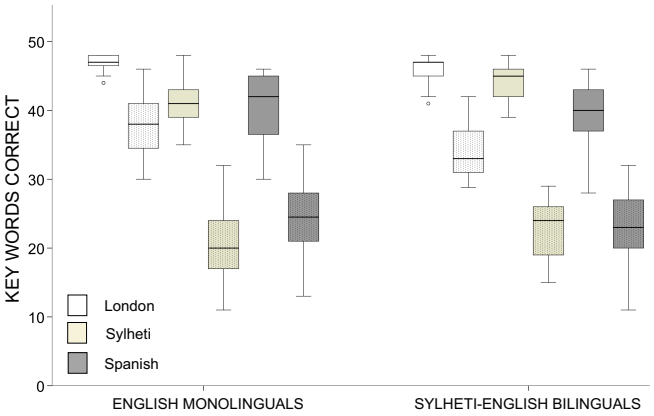
Keyword responses that included morphological errors were scored as correct.

The statistical analysis was run using R [26]. For linear mixed-model analyses the lmer function in the lme4 package [2] was used, with type II analysis-of-variance tables calculated using the package CAR [15], and the 'lsmeans' package [18] was used for post hoc tests.

3. RESULTS

To compare children's performance in the different conditions, we conducted a linear mixed effects model. In the analysis, number of key words correct was the dependent variable. The model included language group (monolingual, bilingual), accent (Spanish, Sylheti, Popular London), and noise (quiet, noise) as fixed factors, and participant as random intercepts.

Figure 1. Boxplots of the children's' keyword accuracy in the three accent conditions. The shaded boxplots are the noise condition, the plain counterpart is the quiet condition.



The results showed a significant main effect of accent ($\chi^2(2)=383.5$, p <.001) and noise ($\chi^2(1)=1273.1$, p <.001), and interactions between group and accent ($\chi^2(2)=22.1$, p <.001), and accent and noise ($\chi^2(2)=97.6$, p < .001). As shown in Figure 1, all children performed worse in noise (M = 27) than in quiet (M = 43) (p < .05), as expected. Overall, all children performed best with the Popular London accent in quiet (M monolingual = 47, M bilingual = 45). There was no difference between the groups: both monolingual and bilingual children performed similarly (p > .05). In noise, they also all performed best with the Popular London accent (M monolingual = 38, M bilingual = 34), though the monolinguals were significantly more accurate than the bilinguals (p < .05).

In the Sylheti-accented condition, bilinguals were more accurate than monolinguals in quiet (M monolingual = 40, M bilingual = 45, p < .05), however the groups did not differ in their performance in noise (M monolingual = 20, M bilingual = 22, p > .05). For the Spanish accent, there were no significant differences in performance: both groups performed similarly in quiet (M monolingual = 40, M bilingual = 39) and in noise (M monolingual = 23, M bilingual = 23) (p > .05). Interestingly, however, bilinguals performed significantly better with the Sylheti accent than the Spanish accent (p < .05), but the monolinguals performed similarly with both.

4. DISCUSSION

The aim of this study was to explore the role of linguistic experience in the processing of familiar and unfamiliar regional and foreign accents, by bilingual and monolingual children. Recent research has suggested that multilingualism and increased exposure to talker and accent variability affects development of accent categorization, such that children growing up in diverse communities may develop the ability to extract, store and use talker variation in speech processing in a more fine-grained way, earlier in development [12, 17]. We were interested in whether or not this might also affect comprehension, such that children who are exposed to more variation might be better able to understand unfamiliar accented speech, here, Spanish-accented English. To investigate this, we assessed comprehension in quiet and noise in sequential bilinguals, who are regularly exposed to a foreign accent in their community, and compared their performance on familiar and unfamiliar regional and foreign accents with that of inner London monolinguals, who were exposed predominantly to a single accent of their native language, Popular London English.

As expected, all children were more accurate in quiet than noise [cf. 6]. In quiet, children performed best with their familiar accents [6]. The monolinguals were most accurate in the Popular London accent condition, and bilinguals with both the Popular London and Sylheti-accented talkers. The monolinguals performed significantly worse with both foreign accents than with the London accent. However, although monolinguals performed more poorly than the bilinguals in the Sylheti-accented condition, this was not the case for the Spanish accent: both groups performed similarly poorly. The bilinguals experience with foreign-accented speech did not therefore seem to generalize to an unfamiliar foreign accent [see also 19]; they performed significantly more poorly with the Spanish accent condition than their familiar foreign accent, Sylheti-English, and performed similarly to the monolinguals

with Spanish-accented English. This is in contrast to findings from accent categorization tasks which have shown that children aged 5-7yrs, growing up bilingually in a diverse, multilingual community develop sensitivity to accent variation earlier in development than monolinguals, who are only able to categorize talkers when the differences between them are maximized (e.g., home accent vs. an unfamiliar foreign accent [12]). One possibility is that these bilinguals had not had as much experience with different talkers and accents as those in that study. Although also from inner London, our sequential bilinguals were predominantly exposed to a single dominant foreign accent, Sylheti-English, alongside varieties of London English, in particular MLE and Popular London. Thus, the nature of their environment may not have provided them with the variation needed to develop the detailed and robust enough representations required to generalize their processing skills to other accents.

Another possibility is that differences in bilinguals' performance on categorization and comprehension tasks reflects the different demands of the tasks. Although accent categorization tasks in which children learn to associate a particular accent with a character or puppet are cognitively demanding, and stimuli are presented in quiet, children may be able to do the task without understanding every word. However, in order to succeed in a sentence comprehension task, children need to match the incoming signal to their own underlying lexical representations to achieve lexical access for all of the words [6, 7] and then remember the sentence in order to be able to repeat it. This may have reduced the cognitive resources available for processing the unfamiliar foreign accent, such that bilingual children were not at any advantage in comparison to their monolingual peers (cf. [6]).

In noise, we found a different pattern of results. As might have been expected, all children were most accurate with the Popular London accent, and as has been shown in studies with adults, noise had a greater masking effect for the foreign accents [4]. The bilinguals, however, were less accurate than the monolinguals in Popular London in noise and lost their advantage for the Sylheti accent. One possible explanation for this could be that there are differences in more general linguistic skills between the two groups. The children were matched for receptive vocabulary, so it is unlikely that lexical knowledge was driving the differences. However, recent research has shown differences in phonological processing skills between sequential bilinguals and monolinguals [21, 23]. For example, Sylheti-English bilinguals have been shown to have poorer English nonword repetition than their monolingual English peers, specifically for words that contain illegal phonotactics in Sylheti [24]. Such differences may have resulted in poorer speech processing in adverse listening conditions in the bilingual children. Another possibility then, is that although our bilinguals were more familiar with the Sylheti-accented speech, this may not have extended to giving them an advantage in adverse listening conditions.

5. CONCLUSION

This study has shown that early experience with variation gives rise to differences in the ability to understand accented speech. Children appear to develop to be specialized for the accents they hear most within their immediate community, supporting the idea that children's representations are initially influenced by their core set of experiences with their home accent(s). However, all children are highly susceptible to environmental degradation. Further, environmental differences may result in different developmental trajectories for different processing skills; whilst bilinguals perform better than monolinguals in accent categorization tasks, they appear to be more adversely affected by noise than monolinguals. Further research is needed to establish whether or not this might be linked to differences in the development of phonetic and phonological representations, and/or general cognitive processes.

6. REFERENCES

[1] Adank, P., Evans, B.G., Stuart-Smith, J., Scott, S.K. 2009. Comprehension of Familiar and Unfamiliar Native Accents under Adverse Listening Conditions. *Journal of Experimental Psychology*: *Human Perception and Performance* 35 (2): 520-529.

[2] Bates, D., Maechler, M., Bolker, B., Walker, S. 2015 lme4: Linear mixed-effects models using Eigen and S4. R package version 1.1-9, https://CRAN.Rproject.org/package=lme4.

[3] Bench, J., Kowal, A, Bamford, J. 1979. The BKB (Bamford-Kowal-Bench) sentence lists for partially-hearing children. *British Journal of Audiology* 13(3): 108-12

[4] Bent, T. 2014. Children's perception of foreign-accented words. *Journal of Child Language*: 1 – 22

[5] Bent, T., Atagi, E. 2015. Children's perception of nonnative-accented sentences in noise and quiet. *Journal of the Acoustical Society of America*. 138(6), 3985-3993

[6] Bent, T., Frush-Holt, R. 2018. Shh…I need quiet! Children's understanding of American, British and Japanese accented English. *Language & Speech*, 61(4), 657-673

[7] Best, C.T., Tyler, M., Gooding, T., Orlando, C., Quann C. 2009. Development of phonological constancy: toddlers' perception of native- and Jamaican-accented words. *Psychological Science* 20(5): 539 - 542

[8] Cheshire, J., Kerswill, P., Fox, S., Torgersen, E. 2011. Contact, the feature pool and the speech community: The emergence of Multicultural London English. *Journal of Sociolinguistics* 15(2): 151-196.

[9] Clopper, C.G., Bradlow, A. 2008. Perception of dialect variation in noise: intelligibility and classification. *Language and Speech,* 51: 175–198

[10] Cristia, A., Seidl, A., Vaughn, C., Schmale, R., Bradlow, A., Floccia, C. 2012. Linguistic processing of accented speech across the lifespan. *Frontiers in Psychology* 479: 1-6.

[11] Dunn, D.M., Dunn, L.M. 2009. *The British Picture Vocabulary Scale*. National Foundation for Educational Research in England and Wales; GL Assessment (Firm) London : GL Assessment 3rd ed.

[12] Evans, B.G., Tomé Lourido, G. (2019). Effects of language background on the development of sociolinguistic awareness: the perception of accent variation in monolingual and multilingual 5-7 year old children. *Phonetica*

[13] Floccia C., Butler, J., Girard, F., Goslin, J. 2009. Categorization of regional and foreign accent in 5- to 7-year-old British children. *International Journal of Behavioral Development* 33 (4): 366 -375

[14] Floccia, C., Goslin, J., Girard, F., Konopczynski, G. 2006. Does a Regional Accent Perturb Speech Processing? *Journal of Experimental Psychology: Human Perception and Performance* 32 (5): 1276–1293.

[15] Fox, J., Weisberg, S. 2011. *An R Companion to Applied Regression*, Second Edition. Sage, Thousand Oaks California

[16] Gass, S. (1984) The effect of familiarity on the comprehensibility of non-native speech. *Language Learning*, 34(1): 65-89

[17] Jeffries, E. 2016. Children's developing awareness of regional accents: A socioperceptual investigation of pre-school and primary school children in York. Unpublished PhD thesis, University of York, UK.

[18] Lenth, R.V. 2016. Least-Squares Means: The R Package lsmeans. *Journal of Statistical Software* 69(1): 1-33.

[19] Levy, H. Konieczny, L & Hanulikova, A. (2019). Processing of unfamiliar accents in monolingual and bilingual children. *Journal of Child Language* 42(6): 368-392.

[20] MATLAB and Statistics Toolbox Release 2017a, The MathWorks, Inc., Natick, Massachusetts, United States.

[21] McCarthy, K.M. 2014. Growing up in an immigrant community: The phonemic development of sequential bilinguals. Unpublished PhD thesis, University College London, UK.

[22] McCarthy, K.M., Evans, B.G., Mahon, M. 2013. Acquiring a second language in an immigrant community: The production of Sylheti and English stops and vowels by London-Bengali speakers. *Journal of Phonetics* 41: 344-358.

[23] McCarthy, K.M., Mahon, M., Rosen, S., Evans, B.G. 2014. Speech perception and production by sequential bilingual children: A longitudinal study of Voice Onset Time Acquisition. *Child Development* 85(5): 1965-1980.

[24] McCarthy, K.M., Skoruppa, K. 2017. The relationship between first language phonotactics and early reading skills in sequential bilingual children. Poster presented at: *42nd Boston University Conference on Language Development*, Nov 2017

[25] Newton, C., Ridgway, S. 2015. Novel Accent Perception in typically-developing school-aged children. *Child Language Teaching & Therapy* 32(1): 111-123

[26] R Core Team. 2018. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. http://www.R-project.org/.

[27] Scott, D.R., Cutler A. 1984. Segmental phonology and the perception of syntactic structure. *Journal of verbal learning & verbal behaviour*. 23: 450–466.

[28] Van Heugten, M., Paquette-Smith, M., Krieger, D. R., & Johnson, E. K. 2018. Infants' recognition of foreign-accented words: Flexible yet precise signal-to-word mapping strategies. *Journal of Memory and Language*, 100: 51-60

[29] Wagner L., Clopper, C.G., Pate, J.K. 2013. Children's perception of dialect variation. *Journal of Child Language*, 41(5): 1062-84

[30] Wells, J.C. 1982. *Accents of English*. Cambridge: Cambridge University Press.