Effects of Accent Exposure on Monolingual and Bilingual Children's Early Vocabulary Development

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Abstract

Past studies have revealed that language experience impacts children's vocabulary development. For example, bilingual children tend to have smaller vocabularies than monolingual children in each of their languages. However, it is unclear whether routine exposure to multiple accents also affects children's vocabulary growth. Here, using standardized vocabulary assessments, we compared the reported vocabulary sizes of 11- to 34-month-old monolingual and bilingual children (N = 2881) who had various degrees of accent exposure. Our results show that routine exposure to multiple accents, regardless of accent type, does not negatively impact vocabulary development. Our findings suggest that children are well-equipped to handle language variation in their input.

Keywords: vocabulary development; bilingualism; multi-accent language input

In recent years, research examining language acquisition in monolingual versus bilingual infants and toddlers has become increasingly common (e.g., Costa & Sebastián-Gallés, 2014). We have learned that monolingual children recognize words faster than bilingual children (e.g., De Groot et al., 2002), and that bilingual children often have smaller vocabularies in each of their languages than monolingual children (e.g., Hoff et al., 2012). However, less is known about children who are routinely exposed to multiple varieties of their native language (i.e., multi-accent children; Johnson, 2018). To date, despite growing evidence that multi-accent exposure affects speech processing, no large-scale study has examined the role of accent exposure in vocabulary development. In the current study, we explore 1) how routine exposure to multiple accents affects monolingual and bilingual children's vocabulary growth, and 2) whether these results are moderated by accent type and/ or the number of other-accented talkers a child routinely encounters.

Early vocabulary development is correlated with children's quantity of input (e.g., Catanni et al., 2014; Floccia et al., 2018), such that those who receive more language input tend to have larger vocabularies and steeper vocabulary growth trajectories (e.g., Song et al., 2014). In addition, quality of input is also crucial. For example, number of different words, number of "rare" words, and sentence complexity have all been found to predict children's vocabulary at a later age (e.g., Huttenlocher et al., 2010). Bilinguals often receive less exposure in either of their languages when compared to their monolingual peers because their input is split between multiple languages. Moreover, they are more likely to hear input from non-native speakers than monolinguals (Fernald, 2006). And compared with (some) native speakers, non-native speakers are likely to have less diverse and less sophisticated vocabulary and morphosyntax (e.g., Core & Hoff, 2014). For these reasons, it is therefore not surprising that bilingual children usually have a smaller vocabulary size in each of their languages than monolingual children (but similar total vocabulary size if both languages are considered; e.g., Hoff et al., 2012).

Apart from the differences in quantity and quality of their language input, bilingual children may also be more likely to encounter multiple accents in their speech input. That is, compared to their monolingual peers, bilingual children's input contains more lexical and phonetic variability. Research with monolingual children found that infants initially struggle with recognizing words spoken in an unfamiliar accent (Best et al., 2009). This difficulty continues into later childhood (Nathan et al., 1998; Newton & Ridgway, 2016). Indeed, monolingual children who are routinely exposed to multiple accents (multi-accent children) have been found to process speech differently than those exposed to only one variant (mono-accent children). For example, multi-accent 24-month-olds are slower in their recognition of familiar words spoken in the locally dominant variety of English than their mono-accent peers (Buckler et al., 2017). However, it is unclear whether this difficulty in speech processing extends to vocabulary learning, and whether it affects monolingual and bilingual children equally.

It is possible that routine exposure to multiple accents may slow vocabulary learning in children. Imagine a child who has an American mother and a British father learns the word "*tomato*" from the mother. And later that day when the father asks the child "Where is the *tomahto*?", the child may treat *tomahto* as a new word. This is because young children use word learning biases such as mutual exclusivity principle, where they avoid applying two labels to the same object (e.g., Markman and Wachtel, 1988). Over time, the child may learn to develop more relaxed phonetic boundaries to accommodate variations in speech (e.g., White & Aslin, 2011). This may lead to a greater acceptance of mispronounced words as the same lexical item, for example the child may treat *tomito* as the same word as *tomato* (see Durrant et al., 2015). Both failing to connect word forms in different accents and over-generalizing will disrupt early vocabulary learning. It is possible that routine exposure to multiple accents will affect monolingual children in a similar manner as bilingual children because both bilingual and multi-accent monolingual children are acquiring two distinct phonologies (to varying degrees). Alternatively, bilingual children may behave differently than monolingual children due to their more relaxed use of the mutual exclusivity principle in the face of their more variable lexical and phonetic input (e.g., Davidson & Tell, 2005).

On the other hand, one could also predict that routine exposure to multiple accents has no impact on children's vocabulary development. For example, in van der Feest and Johnson (2016), they compared 24-month-olds who were routinely exposed to two variants of Dutch to their age-matched peers who were only exposed to the dominant variant of Dutch. As expected, children who had experience with both variants of Dutch had no difficulty adapting to both variants. However, those who only had exposure to the dominant variant of Dutch were also able to adapt to the non-dominant variant when given two minutes of exposure to that variant. The flexibility in children's signal-to-word mapping strategies suggests that children are well-equipped to handle speech variability in their environment.

Past studies on vocabulary development have mostly focused on monolingual children. And studies that compare monolingual and bilingual children often treat them as binary categories, ignoring the language variety differences in their input. This study is the first to examine the role of accent exposure in early vocabulary development in monolingual and bilingual children. We also explore how the degree of accent variability moderates children's vocabulary size by examining accent type (i.e., regional vs. non-native accents) as well as the number of other-accented talkers children have regular exposure to. To test these, we assess vocabulary scores using standardized vocabulary tests in a large sample of monolingual and bilingual children with various degrees of accent exposure. Based on the previous literature (e.g., Hoff et al., 2012), we predicted that bilingual children would have smaller English vocabularies when compared to their monolingual peers. Predicting how routine accent exposure would affect children's vocabulary size was more difficult, since this is the first study to examine this question. But if processing accented speech is difficult for young children (as some previous research suggests), then it seems reasonable to predict that children who have exposure to more accent variability will have smaller English vocabularies than those with exposure to less accent variability.

Method

Participants

We recruited 2881 typically developing monolingual and bilingual children between the ages of 11- to 34-months old from our database. This sample was representative of the Canadian population in the Greater Toronto Area in terms of linguistic diversity (Statistics Canada, 2021). All monolingual children were exposed to English at least 90% of the time (*M* = 97%). Of those, 1353 children (631 boys) were exposed to only the locally dominant variety of English (mono-accent; less than six hours a week to other varieties of English); and 824 children (398 boys) were exposed to multiple varieties of English (multi-accent; spoken by caregivers with whom they spent at least 40 hours a week). In addition, we recruited 704 bilingual children (English exposure between 30% to 70%.; *M* = 54%; 336 boys) who had various degrees of accent exposure.

Materials

Because our sample included children from a wide age range, we used three vocabulary checklists from age-appropriate MacArthur-Bates Communicative Development Inventory (CDI) forms to measure children's expressive vocabularies (Words and Gestures: 11 to 18 months old; Words and Sentences: 19 to 29 months old; CDI-III: 30 months and above; Fenson et al., 1994). Previous studies have demonstrated that parental CDI measures are a valid and reliable measure of children's language knowledge (e.g., Styles & Plunkett, 2009).

Procedure

Caregivers were asked detailed questions on the language input that their children heard either during an in-person visit or over Zoom. This allowed us to assign children to their respective language exposure bin. Eligible participants were asked to fill out a CDI form (either in-person or at home), with detailed instructions provided beforehand. Finally, caregivers reported basic demographic information (family income, education level).

Analysis

In our analyses, we used CDI raw scores instead of normed percentile scores because using the normed percentile scores would have inflated infants' vocabulary scores (e.g., an 11-month-old boy who has yet to produce any word will have a 35^{th} percentile score). Because there was no single standardized test appropriate for use with our entire age range, and including three different standardized tests in a single model was not possible, we performed separate analyses for the three different CDI forms: W&G (Words and Gestures: 11 to 18 months old), W&S (Words and Sentences: 19 to 29 months old), and CDI-III (30 months old and above). In each model, we fit a linear regression to our data using the *lm* function in R.

Results

First, we examined whether our results could replicate the effect of bilingualism on vocabulary development. In order to meet the assumptions of linear regression models, the data on W&G were log-transformed; whereas the data on W&S and CDI-III were Box–Cox-transformed with λ = 0.55 (scaled score = (raw score$^{0.55}$ – 1)/0.55) and with λ = 0.93 (scaled score = (raw score$^{0.93}$ – 1)/0.93), respectively (Singh et al., 2021). Children's transformed CDI scores were entered as the response variable. Language Group was entered as independent variables while controlling for Income, Gender, and Age. We coded Language Group with Helmert contrasts to compare the CDI scores of bilingual vs mono-accent and multi-accent monolingual children combined. In addition, Gender (Male = -0.5; Female = 0.5) were simple-coded whereas Income and Age were mean-centered.

As shown in Figure 1, our models revealed that monolingual children had higher vocabulary scores than bilingual children in both W&S (β = 10.07, *SE* = 1.09, *t* = 9.27, *p* < .001) and CDI-III (β = 12.47, *SE* = 2.11, *t* = 5.92, *p* < .001). This suggests that, consistent with previous literature, bilingual toddlers had smaller English vocabulary size than their monolingual peers (e.g., Hoff et al., 2012; Poulin-Dubois et al., 2013). However, this result is only found in older, but not in younger (β = 0.02, *SE* = 0.12, *t* = 0.16, *p* = .87), children. This could be due to a floor effect in the infants' small vocabularies.

Next, we asked whether routine exposure to multiple accents affects monolingual children's vocabulary development in a manner akin to bilingualism. To test this, we compared the CDI scores obtained from bilingual children to those from mono-accent and multi-accent monolingual children. We analyzed our results using the same models as above. The only difference is that, instead of using Helmert contrasts, we simple coded Language Group with multi-accent monolingual children as the reference group. This results in two contrasts: (1) Bilingual vs Multi-accent monolingual children and (2) Mono-accent vs Multi-accent monolingual children.

Our models revealed that mono-accent and multi-accent monolingual children did not differ in any ages we examined (see Figure 1). Taken together, our findings demonstrate that routine exposure to multiple accents did not affect monolingual children's vocabulary development. We also show that, regardless of accent exposure, monolingual children had larger English vocabularies than bilingual children at older ages.

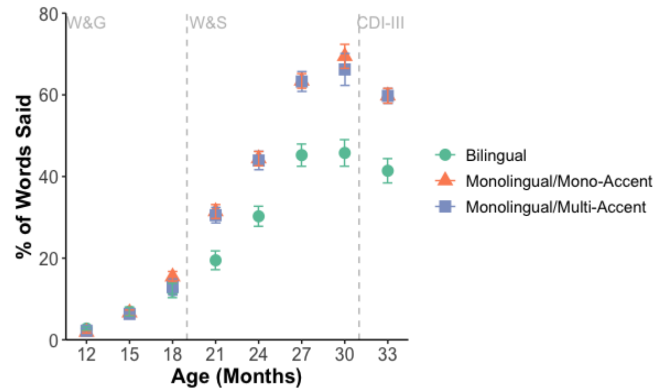

Figure 1: Proportion of words (number of words produced by children / total number of words in the checklist) produced by bilingual children, mono-accent monolingual children, and multi-accent monolingual children. Error bars indicate the standard error. Note that the drop in vocabulary size observed in the last age group is likely due to a change in CDI forms.

To explore whether the type of accent exposure moderated children's vocabulary development, we compared the CDI scores of monolingual children who were exposed to regional vs non-native accents. This is because previous studies have suggested that non-native accents are usually less intelligible than regional accents (e.g., Adank et al., 2009; Bent et al., 2016; Floccia et al., 2006), which may have a more detrimental effect on children's vocabulary growth.

However, as shown in Figure 2, monolingual children who were exposed to non-native accents seem to have similar vocabulary size as children who were exposed to regional accents. We tested this with linear regression models. In order to meet the assumptions of linear regression models, similar to above, the data on W&G were log-transformed; whereas the data on W&S and CDI-III were Box–Cox-transformed with λ = 0.63 (scaled score = (raw score$^{0.63}$ – 1)/0.63) and with λ = 0.95 (scaled score = (raw score$^{0.95}$ – 1)/0.95), respectively (Singh et al., 2021). Children's transformed CDI scores were entered as the response variable. Accent Type was entered as independent variables while controlling for Income, Gender, and Age. Accent Type (Regional accent = -0.5, Non-native accent = 0.5) and Gender (Male = -0.5; Female = 0.5) were simple-coded whereas Income and Age were mean-centered. Our analyses confirm that, regardless of the type of accent children were exposed to, multi-accent children exhibit similar vocabulary development (W&G: β = 0.05, *SE* = 0.30, *t* = 0.18, *p* = .86; W&S: β = 1.36, *SE* = 3.01, *t* = 0.45, *p* = .65; CDI-III: β = 1.76, *SE* = 3.85, *t* = 0.46, *p* = .65).

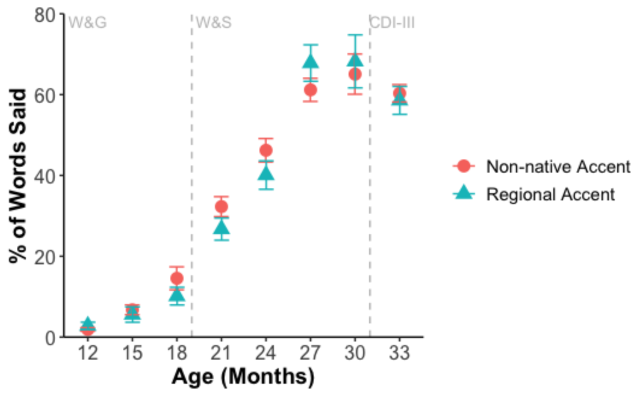

Figure 2: Proportion of words (number of words produced by children / total number of words in the checklist) produced by multi-accent children, broken down by accent type. Error bars indicate the standard error. Note that the drop in vocabulary size observed in the last age group is likely due to a change in CDI forms.

Finally, because there is some evidence that increasing talker variability can be helpful for children to learn sound patterns (Siedl at al., 2014), we asked whether the number of other-accented talkers children had routine exposure to moderates vocabulary size, and whether it differs by monolingual and bilingual children. For this analysis, we only included children who had routine exposure to at least one other-accented talker so that all children had substantial exposure to other-accented speech. In order to meet the assumptions of linear regression models, the data on W&G were log-transformed; whereas the data on W&S and CDI-III were Box–Cox-transformed with λ = 0.51 (scaled score = (raw score$^{0.51}$ – 1)/0.51) and with λ = 0.63 (scaled score = (raw score$^{0.63}$ – 1)/0.63), respectively (Singh et al., 2021). Children's transformed CDI scores were entered as the response variable. Language Group and Other-accented Speaker were entered as independent variables while controlling for Gender, Income, Age, and Percentage of English Exposure. Language Group (Bilingual = -0.5, Monolingual/Multi-Accent = 0.5) and Gender (Male = -0.5; Female = 0.5) were simple-coded whereas Other-accented Speakers, Income, and Age were mean-centered. Our models revealed a significant effect of Other-accented Speaker in both W&S (β = 1.35, SE = 0.65, t = 2.07, p = .03) and CDI-III (β = 3.05, SE = 0.88, t = 3.47, p < .001), which indicates that older children who had routine exposure to more other-accented talkers had larger vocabularies. As shown in Figure 3, although this effect looks descriptively bigger in bilingual than in monolingual children, our model revealed that this effect does not differ significantly by Language Group (W&S: β = 3.90, SE = 5.15, t = 0.76, p = .45; CDI-III: β = 2.27, SE = 4.25, t = 0.06, p = .95)

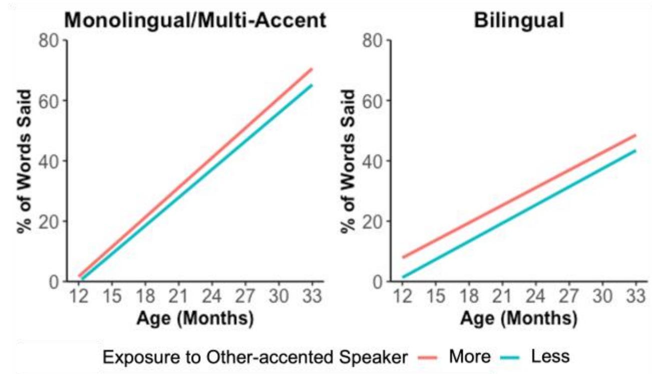

Figure 3: Proportion of words (number of words produced by children / total number of words in the checklist) produced by monolingual (left) and bilingual children (right), broken down by children who have regular exposure to more and less other-accented speakers. Those who had routine exposure to more than two speakers were categorized as having *more* exposure to other-accented speaker.

Discussion

The present study sought to understand how routine exposure to multiple accents impact vocabulary development, a factor that has been overlooked in most previous studies. As predicted, we found that bilingual children in our sample had smaller English vocabularies than monolingual children. However, contrary to suggestions in the literature, exposure to multiple accents did not seem to slow vocabulary growth. This is evidenced by the fact that monolingual children who were exposed to multiple accents followed a similar vocabulary growth trajectory as children who were only exposed to one variant.

The lack of difference between mono- and multi-accent monolingual children suggests that the differences that were previously found in their speech processing abilities (e.g., Buckler et al., 2017; Van Heugten & Johnson, 2017) do not negatively impact multi-accent children's vocabulary development. Given processing speed is correlated with vocabulary size (e.g., Peter et al., 2019), why does routine exposure to accent variability affect speech processing but not vocabulary development? One possible explanation is that our measure (i.e., CDI forms) may not have been sensitive enough to detect the difference between mono- and multi-accent children's vocabulary size. Another possibility is that eye-tracking studies have under-estimated children's ability to process accented speech (Johnson et al., 2022). Indeed, lab studies showing that infants and toddlers struggle to recognize words produced in other accents could be argued to lack ecological validity in their use of unfamiliar, and often disembodied, voices producing words with little to no communicative context. Evidence to support this latter view comes from studies showing that 15-month-olds can recognize familiar words in a novel accent following a brief period of exposure to that accent (Van Heugten & Johnson, 2014; Paquette-Smith et al. 2021).

Interestingly, our findings also show that children's vocabulary development did not differ by the type of accent they were exposed to. That is, children who were exposed to regional accents show the same vocabulary growth as those who were exposed to non-native accents. Compared to regional accents, non-native accented speech by nature exhibits larger between- as well as within-talker variability. This is because the acoustic-phonetic realizations (e.g., phonemes insertion or deletion, lexical stress) are affected by the L1 of the non-native speaker as well as their L2 proficiency. The fact that children's vocabularies were not affected by the type of accent they were exposed to seems to suggest that children are well-equipped to handle speech variability in their environment from infancy.

When we compared children who had substantial amount of other-accent exposure, we found that exposure to more other-accented talkers did not negatively impact vocabulary development; rather, it facilitated vocabulary growth in both monolingual and bilingual children. One possible explanation for this finding is that accent variability supports accent adaptation. For children to recognize words across accents, they first have to learn which dimensions of acoustic-phonetic variability are meaningful for lexical identity. Given the between-talker variability within accents, exposure to more talkers may facilitate token generalization by allowing children to disregard information identified as highly variable across tokens, which, in turn, facilitates word learning. Indeed, in Rost and McMurray (2009), 14-month-olds only successfully learned to discriminate minimal word pair following the multiple, but not single, speaker training phase, supporting the notion that speaker-related variability leads children to focus on the invariant aspects of the input. Another possibility is that this finding is reflective of an advantage of being exposed to multiple talkers (regardless of accents). Children who are exposed to multiple talkers may experience more diversity in their language input, which is positively correlated with children's vocabularies (e.g., Rowe, 2012). Future studies need to further explore this phenomenon to help us adjudicate between these two possibilities.

To conclude, our study is the first to demonstrate that routine exposure to multiple accents has no negative impact on children's early vocabulary development. And for children who have regular exposure to multiple accents, increased input variety in the form of multiple talkers may be beneficial to their vocabulary growth. These results add to the growing literature of how accent exposure impacts early language development. Our findings also highlight the importance of considering the nuance within the traditional "monolingual" and "bilingual" dichotomy to provide a more accurate representation of the acquisition challenges faced by many children in the world.

References

Adank, P., & Janse, E. (2010). Comprehension of a novel accent by young and older listeners. *Psychology of Aging, 25*, 736–740.

Bent, T., Baese-Berk, M., Borrie, S. A., & McKee, M. (2016). Individual differences in the perception of regional, nonnative, and disordered speech varieties. *Journal of the Acoustical Society of America, 140*(5), 3775–86.

Best, C.T., Tyler, M.D., Gooding, T.N., Orlando, C.B., & Quann, C.A. (2009). Development of phonological constancy: Toddlers' perception of native- and Jamaican accented words. *Psychological Science, 20*, 539–542.

Buckler, H., Oczak-Arsic, S., Siddiqui, N., & Johnson, E.K. (2017). Input matters: speed of word recognition in two-year-olds exposed to multiple accents. *Journal of Experimental Child Psychology, 164,* 87-100. http://doi.org/10.1016/j.jecp.2017.06.017

Cattani, A., Abbot-Smith, K., Farag, R., Krott, A., Arreckx, F., Dennis, I., & Floccia, C. (2014). How much exposure to english is necessary for a bilingual toddler to perform like a monolingual peer in language tests? *International Journal of Language & Communication Disorders, 49*(6), 649-671. https://doi.org/10.1111/1460-6984.12082

Costa, A., & Sebastián-Gallés, N. (2014). How does the bilingual experience sculpt the brain? *Neuroscience, 15*(5), 336–345. https://doi.org/10.1038/nrn3709

Davidson, D., & Tell, D. (2005). Monolingual and bilingual children's use of mutual exclusivity in the naming of whole objects. *Journal of Experimental Child Psychology, 92*(1), 25–45. https://doi.org/10.1016/j.jecp.2005.03.007

de Groot, Annette M. B., Borgwaldt, S., Bos, M., & van den Eijnden, E. (2002). Lexical decision and word naming in bilinguals: Language effects and task effects. Journal of *Memory and Language*, *47*(1), 91-124. https://doi.org/10.1006/jmla.2001.2840

Durrant, S., Delle Luche, C., Cattani, A., & Floccia, C. (2015). Monodialectal and multi- dialectal infants' representation of familiar words. *Journal of Child Language, 42,* 447-465.

Fenson, L., Dale, P. S., Reznick, J. S., Bates, E., Thal, D. J., Pethick, S. J., Tomasello, M., Mervis, C. B., & Stiles, J. (1994). Variability in Early Communicative Development. *Monographs of the Society for Research in Child Development*, *59*(5), i–185. https://doi.org/10.2307/1166093

Fernald, A. (2006). When infants hear two languages: Interpreting research on early speech perception by bilingual children. In P. McCardle & E. Hoff (Eds.), Childhood bilingualism: Research on infancy through school age (pp. 19–29). Clevedon, UK: Multilingual Matters Press.

Floccia C., Sambrook T. D., Delle Luche C., Kwok R., Goslin J., White L., Cattani A., Sullivan E., Abbot–Smith K., Krott A., Mills D., Rowland C., Gervain J., Plunkett K., Hoff E., Core C., Patricia J. (2018). Vocabulary of 2-year-olds learning English and an

additional language: Norms and effects of linguistic distance. *Monographs of the Society for Research in Child Development*, 83(1), 7–29.
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), 1276–93.
Hoff, E., Core, C., Place, S., Rumiche, R., Señor, M., & Parra, M. (2012). Dual language exposure and early bilingual development. *Journal of Child Language*, *39*(1), 1-27.
Huttenlocher, J., Waterfall, H., Vasilyeva, M., Vevea, J., & Hedges, L. V. (2010). Sources of variability in children's language growth. *Cognitive Psychology*, *61*(4), 343–365. https://doi.org/10.1016/j.cogpsych.2010.08.002
Johnson, E.K. (2018). Putting the terms 'monolingual' and 'bilingual' under the microscope. *Applied Psycholinguistics, 39(4),* 753-756. http://doi.org/10.1017/S0142716418000206
Johnson, E.K., van Heugten, M., & Buckler, H. (2022). Navigating accent variation: a developmental perspective. *Annual Review of Linguistics, 8,* 365-387. http://doi.org/10.1146/annurev-linguistics-032521-053717
Markman, E. M., & Wachtel, G. F. (1988). Children's use of mutual exclusivity to constrain the meanings of words. *Cognitive Psychology*, *20*(2), 121–157. https://doi.org/10.1016/00100285(88)90017-5
Nathan, L., Wells, B., & Donlan, C. (1998). Children's comprehension of unfamiliar regional accents: A preliminary investigation. *Journal of Child Language*, *25*(2), 343–365. https://doi.org/10.1017/S0305000998003444
Newton, C., & Ridgway, S. (2016). Novel accent perception in typically-developing school-aged children. *Child Language Teaching and Therapy*, *32*(1), 111-123. https://doi.org/10.1177/0265659015578464
Paquette-Smith, M., Cooper, A., & Johnson, E.K. (2021). Targeted adaptation in infants following live exposure to an accented talker. *Journal of Child Language, 48(2),* 325-349. http://doi.org/10.1017/S030500092000029X
Peter, M. S., Durrant, S., Jessop, A., Bidgood, A., Pine, J. M., & Rowland, C. F. (2019). Does speed of processing or vocabulary size predict later language growth in toddlers? *Cognitive Psychology*, *115*, 101238. https://doi.org/10.1016/j.cogpsych.2019.101238
Rost, G. C., & McMurray, B. (2009). Speaker variability augments phonological processing in early word learning. *Developmental Science*, *12*(2), 339–49.
Rowe, M. L. (2012). A longitudinal investigation of the role of quantity and quality of child directed speech in vocabulary development. *Child Development, 83,* 1762–1774.
Seidl, A., Onishi, K. H., & Cristia, A. (2014). Talker variation aids young infants' phonotactic learning. *Language Learning and Development*, *10*(4), 297–307. https://doi.org/10.1080/15475441.2013.858575
Singh, L., Cheng, Q., Tan, S. H., Tan, A., & Low, Y. L. (2022). Language acquisition in a multilingual society: English vocabulary norms and predictors in Singaporean children. *Child Development*, *93*, 288– 305. https://doi.org/10.1111/cdev.13676
Song, L., Spier, E. T., & Tamis-Lemonda, C. S. (2014). Reciprocal influences between maternal language and children's language and cognitive development in low-income families. *Journal of Child Language*, *41*(2), 305-326. https://doi.org/10.1017/S0305000912000700
Statistics Canada. (2021). *2021 Census of Population*. https://www12.statcan.gc.ca/census-recensement/2021/as-sa/fogs-spg/page.cfm?topic=6&lang=E&dguid=2021S0503535
Styles, S., & Plunkett, K. (2009). What is 'word understanding' for the parent of a one-year-old? Matching the difficulty of a lexical comprehension task to parental CDI report. *Journal of Child Language*, *36*(4), 895–908. https://doi.org/10.1017/S0305000908009264
Van der Feest, S., & Johnson, E.K. (2016). Input driven differences in toddlers' perception of a disappearing phonological contrast. *Language Acquisition, 23(2),* 89-111. http://doi.org/10.1080/10489223.2015.1047096
van Heugten, M., & Johnson, E.K. (2014). Learning to contend with accents in infancy: Benefits of brief speaker exposure. *Journal of Experimental Psychology: General, 143*, 340-350. http://doi.org/10.1037/a0032192
van Heugten, M., & Johnson, E.K. (2017). Input matters: Multi-accent language exposure affects word form recognition in infancy. *The Journal of the Acoustical Society of America Express Letters*, *142*(2), EL196-EL200. doi.org/10.1121/1.4997604
White, K. S., & Aslin, R. N. (2011). Adaptation to novel accents by toddlers. *Developmental Science*, *14*(2), 372–384. https://doi.org/10.1111/j.1467-7687.2010.00986.x