RSC SRC

Impact of COVID-19 on Language and Literacy in Canada

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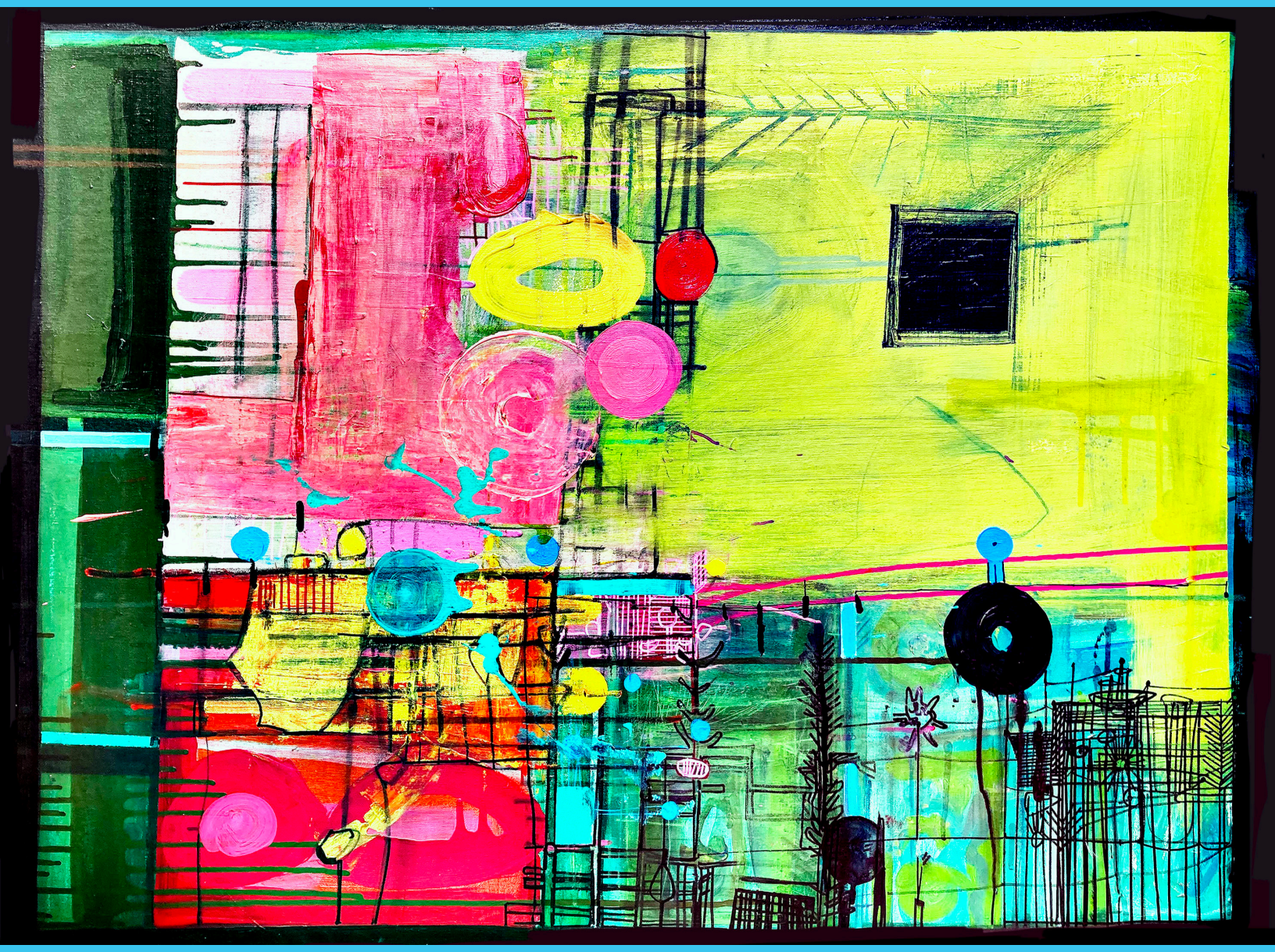

An RSC Collection of Essays

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Cover Art

Hana Hozhabr Pour, *Untitled*, (2020)

Acrylic, coal and oil on canvas, 31" x 47"

My painting depicts a two-fold process of alienation from nature and attempted reconciliation with it in times of the Corona pandemic. To convey this message and using a combination of acrylic, markers, oil and pastels, I try to envision how the current pandemic has ironically created a new and fragmented horizon of possibility for a 'social reconciliation' with nature. I try to depict

this as a dialectic between lines and colors where the former points to estrangement from nature and the latter signals possibility of a sustainable reconciliation.

Land Acknowledgement

The headquarters of the Royal Society of Canada is located in Ottawa, the traditional and unceded territory of the Algonquin Nation.

The opinions expressed in this report are those of the authors and do not necessarily represent those of the Royal Society of Canada.

Background on the Policy Briefing Report Process

Established by the President of the Royal Society of Canada in April 2020, the RSC Task Force on COVID-19 was mandated to provide evidence-informed perspectives on major societal challenges in response to and recovery from COVID-19.

The Task Force established a series of Working Groups to rapidly develop Policy Briefings, with the objective of supporting policy makers with evidence to inform their decisions.

The papers in this report were written by members of The Working Group on Language and Literacy. The Working Group is mandated to provide evidence-informed perspectives on language and literacy in response to and through the recovery from COVID-19. The papers were originally published as a series of opinion pieces with the RSC as well as in *The Globe and Mail*. The first four authors listed below organized the individual papers into the four themes included in this report and co-authored the introduction and thematic overviews.

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Executive Summary

One of the most significant achievements of a young baby's life is the emerging ability to understand and use language to communicate. Language is an inherently social phenomenon—its meaning and power stem from how it is used by members of a community to convey thoughts, ideas, feelings, and to identify tangible elements in the environment. Due to the inherently social nature of language, children rely on information provided by parents to learn the words and rules of their native language.

In older children, youth, and adults, we tend to think of language in the context of an even broader term, literacy. While broader definitions of literacy are sometimes used to indicate fluency in the use of the many skills needed to succeed in society, in this report, unless specifically noted, we define literacy as a person's ability to read and write. Early literacy is linked to better educational attainment levels, improved employment opportunities, and increased earning potential. Moreover, early literacy paves the way for adult literacy later.

Over the past year, the COVID-19 pandemic has impacted the lives and well-being of individuals and communities all over the world. The series of papers collected in this report explore and review the impact of the pandemic on various aspects of language and literacy development. Originally invited as individual contributions, the papers have been organized into four themes for the purpose of this report:

1. Achieving Language and Literacy
2. Multilingualism in Language and Literacy Development
3. Challenges to Language and Literacy Brought on by COVID-19
4. Language Use During COVID-19

Each theme is prefaced with a brief introduction to the topic, followed by the papers themselves. We conclude this report with a compilation of a number of key recommendations directed toward parents, teachers, educators, and policy makers. The wide range of topics covered by these collected papers reflect the many ways that language and literacy have been impacted by the COVID-19 pandemic.

Recommendations

Woven through the articles included in this report are recommendations for supporting the language and literacy development of our population. Here, we summarize 16 recommendations for different stakeholders.

Caregivers & Communities

Language and literacy development begins at home, in infancy, and in caregiver-child interactions. Broadly, we recommend that caregivers continue to support their children's language and literacy development by:

1. Providing rich, one-on-one, back-and-forth social interactions, whether these be in-person or virtually;
2. Establishing a healthy reading and writing routine, and keeping children engaged during these activities by, for example, elaborating on the words and how their meanings connect to tell a story;

3. Monitoring screen time and learning about apps recommended by teachers and researchers for language development;
4. For children in multilingual households, where it is important to the family to maintain the languages, ensuring that caregivers speak and communicate in both/all languages from an early age.

Educators

Outside the home, childcare workers and teachers play an important role in developing children's language and literacy skills. During the pandemic and beyond, educators can support children's language and literacy development by:

5. Continuously monitoring the language and literacy development of children with diverse language experiences;
6. Connecting and collaborating with parents about their children's progress;
7. Providing education on digital literacy to all children so that they can use digital tools safely and productively;
8. Using features of online learning to support learning, e.g., breakout rooms, screen shares and the like.

Researchers

Researchers can work toward creating new knowledge and programs to support children's language and literacy skills. We recommend that they do so by:

9. Fostering collaborations between academics, clinicians, and teachers, so that new knowledge can be applied to practice directly;
10. Fostering collaborations between academics and industry partners in developing high-quality, evidence-based educational apps;
11. Developing new research programs that address questions raised by the pandemic, including investigating the effects of screen time, face masks, and online learning on language and literacy development;
12. Collecting data from more diverse populations.

Community Organizations & Policymakers

Community organizations and policymakers have the responsibility to introduce policies that will support early language and literacy skills. Our broad recommendations include:

13. Equipping people with critical thinking and research skills to identify, question, and evaluate information that they are receiving;
14. Promoting positive attitudes toward bilingualism and increasing the availability of second language and heritage language programs in public schools;
15. Dealing with the critical shortage of licensed childcare spaces, for example through the provision of universal childcare;
16. Reducing inequities that disadvantage sections of our population and rethinking policies around language access.

Theme 1: Achieving Language and Literacy

The articles in this theme describe the connections between early language skills and later literacy. In the first years of life, infants have access to many tools that help them learn important elements of their language ***(Article 1.1)***. For example, infants are especially attuned to human faces early in life, responding differently to human speech and showing a preference for their mother's voice. Humans also learn the sound structure of the words in their native language during infancy. Using these tools, infants begin the process of developing language, and therefore literacy skills, by listening to the speech of their caregivers.

This early learning is vital for later academic success and literacy development ***(Article 1.2)***. Approximately 1 in 4 Canadian children enter school with weak literacy skills, with a disproportionate number of those children coming from disadvantaged socioeconomic communities and/or households (Deloitte 2020). It is crucial for all parents to ensure that their children's home learning environment is enriched with language. Everyday activities such as reading books and singing nursery rhymes all contribute to children's early language and to their later academic success.

The far-reaching impacts of literacy are especially evident in those who feel the personal impact of dyslexia, a condition in which individuals have difficulty reading and writing despite apparently normal vision, intelligence, and spoken language ability ***(Article 1.3)***. The societal costs of reading disabilities are significant and have only worsened during the pandemic. It is imperative that we use the momentum gained during the pandemic to address reading education and impairment by harnessing appropriate technologies to administer evidence-based remediation methods for children with dyslexia.

In this theme...

Article 1.1. The Journey to Language and Literacy Starts in the Cradle, by Suzanne Curtin and Janet F. Werker

1. Social interactions are important for the development of language, communication, and social skills. Caregivers should have rich, emotionally honest interactions engaging the infant in storybooks and labeling objects and events in the environment.
2. Caregivers should provide as much in-person interaction as possible so that infants can use auditory and visual information to inform their learning.
3. While in-person interactions are ideal, extended family and friends can support development by providing responsive interactions over various forms of video chat.

Article 1.2. Why (and How) to Gift Your Child a World of Words, by Kathleen Hipfner-Boucher and Xi Chen

1. Make storybook reading a daily activity. Read a book cover to cover with minimal comment on the first reading to make sure your child has understood the storyline. Over subsequent readings, try to encourage greater child participation in the storytelling, varying what you do such as reading with a goal to maintain your child's interest.
2. Create word/world learning opportunities beyond the home. Explore the outdoors, then talk, draw, or write about what you saw and did when you got home. In doing so, you will lay the knowledge base on which your children's learning—including literacy learning—will build.

3. For parents who are speakers of a minority language, spend time teaching your children words, lyrics, poems, and ideas in the language of your home country. Read to them in your home language.

Article 1.3. Meeting the Challenge of Dyslexia in the Pandemic and Beyond, by Marc F. Joanisse

1. Reading disability, or 'dyslexia', is defined as a persistent difficulty in learning to read; its primary cause is an impairment in the ability to associate letters and sounds. We advocate for an inclusive model for identifying reading disability, as all struggling readers can benefit from remediation.
2. Early identification is essential, as reading difficulties can have a wide-reaching impact on education, socioeconomic success and mental health later in life.
3. Reading instruction for all types of readers should be rooted in phonics/decoding. This approach involves explicit instruction on the relationship between letters and sounds and is proven effective in nearly all types of early readers. Approaches that de-emphasize systematic phonics include "whole-language", "three-cueing" and "blended approaches"; these are not evidence-based and have not proven to be as effective, especially for struggling readers.

Article 1.1. The Journey to Language and Literacy Starts in the Cradle

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The current pandemic has resulted in many people spending more time at home, more time on the internet, and needing to balance their work and personal lives. In a busy household of caregivers and children, it can be even busier with an infant in the home. The concerns parents feel about providing the best for their very young children can be even more magnified. Time and attention are divided, but infants are remarkably well suited—even in our radically changing home lives—to begin their journey to language learning and literacy.

While infants are born ready to acquire language, acquisition happens through the social interactions they have with their caregivers. These interactions allow the child to learn not only the words and structure of their language, but also how to become a communication partner. It is the speech they hear—especially as caregivers label and/or talk about objects and events the infant is interested in- that supports the child's vocabulary acquisition as well as the understanding and use of language. Storybooks and play are also key to providing the foundation for both language and knowledge of the world. Indeed, the OECD 2015 PISA report shows that storybook reading in the preschool years is associated with language comprehension even into adolescence (OECD 2015). It is not just what we say, but the way we talk, and the honesty with which we convey our own feelings and stay open to those of our children. These allow a child to understand another person's emotional state as well as their own, and ultimately be able to talk about both. These behaviors and interactions support not only language, but indeed all aspects of development, and are all part of supporting a child becoming a confident and competent social being.

The world around a newborn infant is filled with all kinds of sights and sounds. Yet, from birth a newborn is drawn to other social beings and is especially attentive to human faces (see Farroni et al. 2005) and voices. A newborn will change their sucking pattern to listen to speech (Vouloumanos & Werker 2007), and their brain will respond differently to speech over other kinds of sounds (Peña et al. 2003; May et al. 2017). Amazingly, they can even discriminate one speech sound from a very similar but different one (e.g., b vs d), and can even do so for sounds not in their native language (see Werker & Curtin 2005, for a review). Surprisingly, newborns show a preference for their mother's voice (DeCasper & Fifer 1980), for the native language (Moon, Cooper & Fifer 1993; Byers-Heinlein, Burns & Werker 2010), and even stories and songs that have been read or sung by their mother (DeCasper & Spence 1986; Cooper & Aslin 1989). Thus, as a result of both biology and early experience, all the building blocks are in place very early in life for learning language (Werker & Curtin 2005; Reh & Werker 2020). In turn language learning supports learning to read (see Wolf 2007), but it is the richness of these interactive experiences with the native language (or languages) that is/are essential to ensure a successful journey.

One step is learning about words. When we think about words, we typically think about what they mean. While this is crucial, a word is more than just meaning: it is made up of sounds, and a change in a sound dramatically changes the meaning of a word. For example, if you change the first sound

in *bed* to a *d* you have a different meaning, and certainly something that one wouldn't wish to confuse. While newborns can tell the difference between very similar sounds, between 6 and 12 months they improve their ability to distinguish the sounds of their native language (or languages, if growing up in a bilingual environment), and become less adept at distinguishing non-native ones (Werker & Tees 1984). At the same time, they are discovering which sound combinations make up possible words. For example, in English, if babies hear the sound combination *tl* they learn this cannot occur at the beginning of a word, such as *tleat*, whereas *tr* would signal a word beginning, as in *treat* (Archer & Curtin 2016). This knowledge is one of the many cues that help babies discover where words begin and end in the speech stream—a particularly challenging aspect of language learning.

While as adults we perceive individual words when listening to speech even though they are not actually separated by silence. Imagine listening to a language that you are not familiar with. It is incredibly challenging to find where one word begins and another one ends without the language-specific experience and knowledge. Mis-segmentation happens all the time. For example, a child who has heard *Miami* might mis-parse this as *My Ami* and follow up with a statement about *Your Ami.* Someone unfamiliar with French might confuse *je dis* (I say) with *Jeudi* (Thursday). As adults, the knowledge of our native language helps guide segmentation, but infants have to figure this out. Luckily, infants have a number of cues they can use to help find words in the continuous speech stream. Research shows they can use highly familiar words such as their name (Bortfeld et al. 2005), they can use the sound combinations as described above, and they can use the rhythm and stress (Curtin, Mintz & Christiansen 2005). And, remarkably, they can track actual statistical regularities as young as 7 months (Saffran, Aslin, & Newport 1996). That is, they learn that it is more probable that the syllables *pre* and *tty* make up a word (*pretty)*, than the syllables *tty* and *ba*, which may cross a word boundary (*pretty baby)*.

As infants begin to find words, they also learn that there are different types of words. There are nouns, verbs, adjectives, and adverbs—all words that carry meaning (called "content" words). There are also function words, such as prepositions (with, on, of), determiners (a, the) and conjunctions (and, or). These words differ in where they can occur in a sentence and also in the surface sound properties. Content words tend to be longer, louder, and are more complex than function words. Infants distinguish these word classes based on the differences in their acoustic properties and by 6 months use function words to pull out and remember content words (Shi 2014). Learning content words is an essential step in learning word meaning, and learning function words is an essential step in figuring out and using the grammar of the native language.

Surprisingly, babies are beginning to show some understanding of words very early. They respond to their own name (Mandel, Jusczyk, & Pisoni 1995), and will look more to the correct image when they hear very common words such as hands and feet, or even "mommy" by 4-6 months (Tincoff & Jusczyk 1999; Bergelson & Swingley 2012). The more words infants know, i.e. as their vocabulary grows, the more anchors they have for pulling out additional words, and the better prepared they are for learning how words combine to form phrases, sentences and longer discourse. All of this growing knowledge works together to reinforce and support additional learning about the native language sound system and helps infants to continue to learn new words. That is, as they learn more words they learn more about the sounds, and the more words they learn, the better they get at learning grammatical structure. Having this foundation in place is not only critical to learning to talk, but also to mapping oral language onto printed text. Indeed, discrimination of speech

sounds (Lovansuu et al. 2018) and learning words in the first 2 years of life (Duff et al. 2015) are related to later reading success.

A question of key concern to parents and educators is whether and how much screen time might support or interfere with language and broader development. While a baby can't learn language by sitting in front of a television, and screens are no substitute for in-person interactions, responsive interactions over various forms of video chat have been shown to support word learning. Moreover, having a responsive person read to (or with) a young child over video chat aids learning (Gaudreau et al. 2020; see Hassinger-Das et al. 2020, for a review). The need to socially engage with family and friends over these kinds of platforms has been amplified during the current pandemic, and we must acknowledge that screens are now, more than ever, part of childrens' lives. Extended family members, friends, and teachers are adapting their interactions and instruction to a virtual world, a trend that will likely continue even after the pandemic ends. We, as a research community, have now turned our attention to how screens can support rather than detract from learning. While research is still ongoing, results to date make it clear that having a strong foundation in language from in person social interaction is key to later benefits from screen time. The content and age-appropriateness of the programming, the way it is delivered, and the engagement of the caregivers have been shown to be critical (Hassinger-Das et al. 2020). Researchers are actively and urgently working to determine how these goals can best be implemented to ensure positive screen time outcomes and benefit development for all children, while paying special attention to the challenges some families face in access to digital media or high speech internet.

In summary, an impressive amount of language learning occurs prior to the child producing their first word, far earlier than most people know, and the foundation for language learning is established during the first year of life. The social communication interactions with parents, other family members and friends are far more important than once realized. They allow infants to break into the speech signal and pull-out sounds, words and sentences, which in turn provide the basis for more complex language use and literacy later.

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Article 1.2. Why (and How) to Gift Your Child a World of Words

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Do you know the meaning of the word 'pernicious'? Can you define it? Name a word that means the same thing as pernicious? A word that is its opposite? Use it in a sentence? Cite examples and counterexamples of "pernicious-ness"? Word knowledge is not all-or-none, it is a matter of degree. Some of you have no doubt never seen or heard the word 'pernicious' before. Others will be vaguely familiar with it. You may have heard it used to describe the influence of school closures due to COVID-19 on children's mental health, for example, but be unable to nail down its precise meaning. Still others will possess a full understanding of the word and be able to use it with confidence. Vocabulary depth and breadth—the number of words we know and how well we know them—matter. They are key language skills underlying our ability to understand what we read. Reading for understanding, in turn, opens the door to success in school and to overall well-being from childhood into adulthood. Research tells us that in comparison to their peers, children with strong vocabulary skills in the preschool and early primary years are better able to understand the texts they read in later grades (e.g., Cunningham & Stanovich 1997). That is why a world of words is among the most important things that we as parents can gift our young children. It is all the more important that we do so in the face of COVID-related disruptions to in-person kindergarten.

The average child will have learned the meaning of about 6000 root words by the end of second grade (Biemiller & Slonim 2001). Much of their word learning up to that point will have happened in the home through conversations and play with parents, caregivers, and older siblings and through shared storybook reading (Cunningham 2005; Weitzman & Snow 2001). However, differences in the quantity and quality of language and literacy experiences offered in the home lead to large gaps in vocabulary between children in the early school years (Biemiller & Slonim 2001). Between grades 3 and 6, most children will add word meanings at about the same rate, but those who enter grade 3 with fewer known words may never succeed in closing the (pernicious) vocabulary gap (Biemiller 2006). And one gap leads to another: children who know fewer words will have a harder time understanding what they read. Hence the importance of exposing children to words, especially within the context of COVID-19. With interruptions to in-person schooling, parents may want to ensure that their children are doing as much word learning as possible in the home to make up for lost learning time in the kindergarten classroom.

Vocabulary is much more than a "mental dictionary"; instead, it is a marker of the varied experiences and understandings children acquire from the earliest age and bring with them to the task of learning to read (Shanahan 2005). For example, a child who has cultivated a passion for dinosaurs through books, visits to a local museum, or a family trip to the Drumheller badlands, may very well recognize and name a brontosaurus, stegosaurus, and tyrannosaurus. But it is equally likely the child will have acquired broader knowledge associated with dinosaurs, perhaps developing awareness of things like extinction, fossilisation, or archeology. Knowing a word implies some

understanding of the many concepts related to it. In fact, it is said that word knowledge reflects world knowledge. World knowledge, also called background knowledge, will become critical when children are expected to read for understanding in school.

What is the relationship between vocabulary and reading? Vocabulary influences the process of learning to read in many ways. In the preschool years, it helps children become aware of the sounds of language, an awareness they must develop in order to learn how to map sounds onto letters. The more words children know, the better their chances of developing sound awareness and of becoming successful early readers (Metsala 1999). Word knowledge also helps children learn to sound out words (Ehri 2002). Sounding out the word *flower*, for example, is made easier if one knows what a flower is and can link the printed word to the concept.

In the middle elementary grades, much of children's word learning is book-based learning of the complex vocabulary associated with the subjects taught in school, like the words *triangular* and *glaciation*. In order to learn the meaning of these challenging words, children need…words. We know that a successful reader must know about 95% of the words in a text (Hirsch 2003). Knowing most of the words helps the reader to get the gist of what they are reading, making it possible to correctly infer—and learn—the meaning of the unknown words. Word learning through print is bolstered by an understanding of the rules of word formation and knowledge of strategies that allow the reader to figure out word meanings by breaking big words into their smaller chunks (roots, affixes) (Desrochers et al. 2018). The success children experience as readers motivates them to read more, multiplying opportunities to learn new words (Wigfield & Guthrie 1997). However, to ensure that all children acquire the depth and breadth of vocabulary needed to become proficient readers, direct instruction in both vocabulary and word learning strategies should be prioritized in school from an early age (NICHD 2000). Vocabulary instruction is particularly important for children from less language rich homes and children who have limited home exposure to the language of the classroom. Vocabulary instruction in school, in combination with parental practices targeting language and literacy development in the home, prepares children to become engaged, life-long readers.

How can you support your children's word learning at home during COVID-19 restrictions? Here are just a few suggestions. Teach your younger children songs and nursery rhymes to develop sound awareness and vocabulary. Take, for example, the following nursery rhyme: *Jack be nimble, Jack be quick, Jack jump over the candlestick!* As you teach it to your child, talk about the similarity in sound between the rhyming words *quick* and *stick*. Think of other words that end with the -ic sound. Make up silly rhyming sentences using the words. Talk about the similarity in initial sound between *Jack* and *jump* and look for other words that begin with the same sound. Think about the meaning of unfamiliar words, like *nimble*. Ask your child to show you how you jump if you are nimble.

Read aloud to your child. Vocabulary can be developed through book reading because children's books contain "big" words that are rarely heard in conversation. Reading to children is important even as they begin to learn to read because with a parent's guidance, children can navigate books that contain more challenging language than the books they can read on their own. And books have the advantage of being available at no cost through public library systems throughout Canada. Consult your local librarian or the internet for recommendations.

For word learning to happen through shared storybook reading, it is important that children experience book reading as a pleasurable activity. The more enjoyment they derive from shared stories, the more likely they are to want to be read to and eventually, to read on their own. Motivation to read supports children through the effortful process of learning to read, so hold your child close and make story time a feel-good experience. Take advantage of the read aloud to encourage story-relevant talk but be sensitive to those moments when your child wants simply to listen to a favourite story, uninterrupted, from beginning to end.

Make storybook reading a daily activity. Establish a reading routine, choosing a fixed story time that works for your family. You may want to read a book cover to cover with minimal comment on the first reading to make sure your child has understood the storyline. Over subsequent readings try to encourage greater child participation in the storytelling, varying what you do from reading to reading with a goal to maintain your child's interest. Ask open-ended questions (who, what, when, where, why, how) about what they see or hear. Expand on your child's response and ask follow-up questions that relate story content to personal experience (*The boy is crying because he lost his ball. How would you feel if you lost your ball? What would you do?*). Provide simple, child-friendly definitions for unknown words, with examples the child knows well (*Chilly means cold. Snowy days are chilly.*) Ask your child for an example of something that is *chilly* and something that is "*not chilly, something that is warm*". It is important that your child say the word to commit it to memory. You may define a complex word, such as *unafraid*, by defining its root (*Afraid means scared. If I'm afraid how might I look?*) and its affix (*Un- means 'not' so unafraid means 'not scared'. If I'm unafraid how might I look?*) After reading, ask your child to retell the story, encouraging the use of new words. Reuse words that you have introduced in novel contexts outside of the read aloud session.

A favourite story in my house, and one that lends itself well to word learning, is Audrey Wood's *The Napping House*. It tells the story of a "snoring granny", a "dreaming boy", and a menagerie of animals who settle in, one by one, for an afternoon nap on granny's "cozy bed". Throughout the book, children are introduced to sleep-related vocabulary (dozing, slumbering, snoozing) through cumulative text that builds with the pile of sleeping bodies (until a "wakeful flea" brings the nap to a chaotic end). The text invites children's participation in the storytelling, giving them ample opportunity to try out novel words. With every turn of the page, Don Wood's illustrations tell a parallel story of a sleepy grey day that gradually gives way to sunshine and frolic.

For many of us, one of the silver linings in the COVID-19 cloud is an abundance of time at home with our children. With interruptions to in-classroom learning, the role of parents as sources of language is amplified. Spend this time giving your children the words they need to succeed. Turn off your devices and connect, instead, with your children. Spend time talking. Make family mealtimes a moment to share; as a prompt, you might ask your children to tell you one thing they did or saw, one thing they learned, and one thing they felt during the day. Offer them an attentive ear as they tell their stories. Spending time talking, singing, reciting nursery rhymes, playing, and reading together will also help to mitigate the social isolation that COVID-19 and online learning have imposed.

As parents, we are having to think creatively about ways to expand our children's COVID-19 restricted world. Fortunately, public health recommendations place few restrictions on access to the outdoors. So, head outside and take advantage of the word/world learning opportunities that await beyond your front door. Then talk, draw, or write about it when you get home. In doing so,

you will lay the knowledge base on which your children's learning—including literacy learning—will build. For those parents who are speakers of a minority language, spend time teaching your children words, lyrics, poems, and ideas in the language of your home country. Read to them in your home language. In time, your children will learn the English or French labels for the concepts you have taught them.

Take advantage of these extraordinary circumstances to prepare your children to become committed, life-long readers. And when all this is over? Keep it up. A child can never know too many words.

Oh, and by the way, pernicious is defined by the Oxford dictionary as "having a harmful effect, especially in a gradual or subtle way".

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Article 1.3. Meeting the Challenge of Dyslexia in the Pandemic and Beyond

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Learning to read is one of the most important things we've ever done. We use the printed word for simple things, like texts from loved ones and recipes for lemon squares, to the most important things like the directions for taking medication. And yet, many people struggle with reading every day, due to an unexpected difficulty in learning to read that we call dyslexia. As the Covid-19 pandemic emphasises our reliance on technology, it's also becoming clear that we need to find a better way forward in addressing reading education and reading impairment.

People with dyslexia struggle with reading and writing despite apparently normal vision, intelligence, and spoken language ability (Ramus, 2004; Verhoeven, Perfetti & Pugh 2019). The disability is not uncommon: about ten percent of school-age children struggle with learning to read (Peterson & Pennington 2012). Typical symptoms include slow reading with frequent errors, difficulty spelling, and poor sentence and text comprehension (REF). But recent work also shows it can co-occur with other learning difficulties as well, including oral language, math, and attention deficits (Archibald et al. 2013; Stevenson et al. 2005).

The societal cost of reading disability is significant (Cree, Kay & Steward, 2012), and is surely only worse in the pandemic. In children, an unaddressed reading difficulty leads to low achievement in other school subjects as well, given how much students need to learn through reading. The statistics also tell us that individuals with dyslexia have higher school drop-out rates and are less likely to pursue post-secondary training (Daniel et al. 2006). Skilled reading is also essential for most jobs, increasingly so in a new economy that's increasingly technology driven. As a result, low literacy is a risk factor for under-employment, homelessness, incarceration, mental health disorders and addiction (Livingston, Siegel & Ribary 2018).

The Nature of Reading Disability

While many of us are aware of dyslexia in a general sense, there are abundant myths about what it is, and what causes it. Maybe the most common one is that readers with dyslexia suffer from a visual disorder that causes them to see letters and words backwards or upside-down (MacDonald et al. 2017). In an educational context, parents might worry about their child making letter reversal errors: confusing 'b' and 'd' for example. But in fact, these sorts of errors are common in all early readers, and it's also clear that readers with dyslexia do not have unusual visual difficulties (Libermaan et al, 1971).

Instead, the prevailing view is that dyslexia is caused by a more profound impairment in the spoken form of language, called 'phonology' (Ramus, 2004; Verhoeven, Perfetti & Pugh 2019; Ziegler & Goswami 2005). This often materializes as problems with phonological awareness: the ability to explicitly think about and manipulate phonemes that make up words. This includes judging whether two words start with the same sound, or whether they rhyme. Phonological ability is essential in learning to read by forming the backbone of learning how the sounds of language match up with the written word. In dyslexia, phonological processing is disrupted, leading to difficulty learning and using these letter-sound associations.

Starting in the 1990s, educators began implementing phonological awareness screening in kindergarten to identify children at risk. They also introduced phonological awareness training as a way to boost reading scores, and perhaps head off reading difficulties in later years. But despite these efforts, dyslexia continues to be a significant problem in many school-age children, and parents of affected children still struggle to find appropriate help for them (Seidenberg 2017).

The ongoing scope of the problem was highlighted in 2019 when the Ontario Human Rights Commission launched its Right to Read Inquiry (see link below); over the course of its consultations, they heard the voices of individuals with dyslexia and their parents, who have struggled to find the support they need. The Commission's final report is anticipated to be released in 2021 and is expected to highlight the difficulty that parents have in getting their child's reading problems identified and addressed, and how teacher training needs to be overhauled.

As I explain below, the challenge is that there continues to be a significant divide between scientific knowledge and practical application. Scientists have made a great deal of headway in understanding both the causes and treatment of dyslexia. However, this has not easily translated into the classroom. So, while it's tempting to place the burden of the problem on classroom teachers, those teachers themselves report having received little in the way of training on the science of reading and reading disability.

Teaching Children to Read

The science of reading tells us children learn to read most effectively when they are taught a 'phonics'-based curriculum (Ehri, 2001; Torgerson, Brooks & Hall 2006). Phonics explicitly teaches learners what sounds go with which letters, and to decode words letter-by-letter so they can read any text, familiar or new. But science has not translated to practice, and instead reading instruction in Canada and other English-speaking countries leans heavily on a competing and flawed model of reading instruction called 'whole-language' (Moats, 2007).

Rather than emphasizing letter-sound decoding, whole language encourages children to memorize and guess. If you've seen leveled-reader books made up of repeating, predictable sentences, and an emphasis on individual reading time over guided instruction, you've seen whole-language in action. Whole-language instruction has persisted for decades, re-appearing under new names like 'three-cueing', 'Searchlight' or a 'blended approach'. Its continued use is partly motivated by the perception that phonics is rigid, old fashioned (the earliest phonics instruction book was published by Hart in 1569!), and incredibly dull. That's led some educators to worry that it teaches children to hate reading before they ever really get going.

And yet, the scientific literature is unequivocal: phonics instruction is essential to promoting stronger reading skills in children, and it can be taught in a way that's engaging and promotes good comprehension and a love of reading. Time spent emphasizing other approaches to reading, including so-called 'blended' approaches that try to do both phonics and whole language, are lost opportunities to teach children to read quickly and effectively (for a discussion, see Castles, Rastle & Nation 2018; and Seidenberg, 2017).

Remediation

This brings us back to dyslexia: nowhere is it more essential to emphasize phonics instruction than in struggling readers. These children have the greatest difficulty with phonological awareness and

letter-sound knowledge, and science tells us that early interventions targeting these skills show the greatest promise in improving these children's reading (e.g., McCandliss et al. 2003).

Remediation programs work best when they progress children through phonological awareness, letter-sound decoding, recognizing consistent grammatical patterns in words (like how *walking*, *talking* and *eating* all end in the *-ing* suffix), and ultimately, understanding sentences and connected texts. But as you might expect, these programs are time-intensive, require educators specifically trained in reading instruction, and are done one-on-one or in small groups. In short, they are costly to implement and involve spending much more time on reading instruction than what you would find in a standard grade-school teaching plan.

As a result, we still haven't seen widespread adoption of science-driven intensive reading intervention programs. In school boards where these are being rolled out, it's often on a quite limited basis, and many parents still struggle to get their children enrolled. Ultimately, there is a greater cost to be paid if we try to do more with less.

Another thing holding back progress is the view of dyslexia as a very specific and severe reading difficulty. In reality, reading impaired children show a spectrum of strengths and weaknesses, and the criteria we use to identify a reading disorder involve choosing artificial cut-off scores along that continuum. This approach risks ignoring cases of children who are struggling readers but just miss the cut-off, or who have multiple learning challenges in addition to their reading problems. Science tells us both these groups of children can benefit from targeted interventions; we can't ignore them on an overly narrow and outdated notion of what dyslexia is and isn't (for an in-depth discussion of these issues, see Elliot & Grigorenko 2014).

Making our definition of reading disability more inclusive will require rethinking how we approach teaching and intervention. The principle of Universal Design for Learning (UDL) is a movement that looks to improve teaching of children with learning difficulties by providing resources for addressing learning challenges in any classroom, in parallel with promoting specialized interventions where needed. In its current form it tends to emphasize the availability of assistive technologies for individuals with reading disability. However, this approach should also extend to how we equip teachers to identify poor readers in their classrooms. This includes better education on dyslexia screening, specifically encouraging educators to adopt a more inclusive model that allows for degrees of disability and correspondingly flexible approaches to intervention, and not one in which we reserve targeted interventions for only the most severe cases.

Technology, E-Learning, and the Pandemic

Technology might eventually be a way to bridge the gap. There are phonics-based e-learning programs that do a great job of making learning to read fun through bright, engaging and fast-paced games. But, although some early readers can get a boost from those solutions, success so far has been limited. No technology-based system so far has been scientifically validated for remediating dyslexia. And at least anecdotally, I've heard from parents of struggling readers who felt their children only showed small benefits from the e-learning systems they tried. So while technology is moving ahead quickly, right now there's no substitute for intensive intervention from in-person educators.

Social distancing and online learning brought on by the pandemic also threatens to widen achievement gaps for children with learning difficulties, in what's being called the 'COVID slide'.

Identifying struggling readers is all the more challenging when teaching children online. Likewise, effective remediation programs are complicated to implement at a distance, since online instruction places increased emphasis on independent learning—a particular challenge for individuals with a reading disability. I fear struggling readers risk being left behind in what could be a lost year.

Even in-person learning presents special challenges right now. While masks are effective in preventing the spread of COVID, they have the unfortunate downside of making spoken language more difficult for children to understand, both by muffling the sounds of speech and hiding the speaker's articulations. One kindergarten teacher told me that children in his class were having difficulty playing along with phonemic awareness games because his mask made it hard for them to make out some sounds of words. Remarkably, his solution was to record YouTube videos of himself leading these activities, unmasked, which he then watches along with the children in the classroom.

Such ingenuity from our teachers is not surprising. When combined with enhanced technological support, a commitment to phonology and UDL, we can combine science with a human-centred approach to support children with dyslexia.

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Theme 2: Multilingualism in Language and Literacy Development

While Canada has two official languages (English and French), the country is also home to speakers of over 200 different Indigenous and immigrant languages. In large cities such as Montréal, Toronto, and Vancouver, around 25% of children grow up in bilingual households. Many more children will encounter a second language—or at the very least, a different accent or perhaps dialect—as they enter childcare and school.

The ability to communicate in two languages has many social and economic benefits, yet many questions and much confusion still surround the best approach to learning two languages. What is the language development of a bilingual child? How can parents, teachers and communities support the transmission of a second, or third, language? How have the recent social distancing measures implemented during the COVID-19 pandemic affected multilingualism in our country?

In this section of the report, we explore how the pandemic has affected language and literacy in multilingual contexts. Different populations are considered, including infants learning two languages from birth, children learning a second language at school, children learning their parent's mother tongue (or heritage language), and communities reclaiming their Indigenous languages.

These articles summarize some of what we know about how children grow up to be bilingual ***(Article 2.1)***, and how adaptive young people are at learning from different accents and languages ***(Article 2.2)***. Additionally, these contributions share examples of how parents and teachers have responded creatively and effectively by adapting to challenges brought about by the pandemic.

A common thread in this theme is the pivot to digitally-mediated tele-communication to continue the delivery of language programs—for example, the Vancouver Bangla community which has responded quickly to offer online Bangla classes ***(Article 2.3)***, and the Gwa'sala-'Nakwaxda'xw Language Revitalization Program which delivers Bak'wamk'ala classes remotely ***(Article 2.4)***. Just as teachers have innovated by harnessing technology to support students' well being and language learning, parents were able to use this time to expose their child to more of their heritage language ***(Article 2.5)***.

In our increasingly multilingual and multicultural country, understanding how the language skills and literacy development of bilingual children have been affected by the pandemic is imperative for ensuring the success and well being of a large portion of our population.

In this theme...

Article 2.1. The Benefits of Being Raised Bilingually, by Krista Byers-Heinlein, Guofang Li, AJ Orena, and Kyle Levesque

1. If you are fluent in more than one language, start talking to your child in two languages as early as possible—doing so does not confuse them, and it is an effective way to kick start bilingualism.
2. There are many ways to raise a bilingual child, but a good plan ensures that children receive plenty of socially-driven exposure to each language throughout childhood.
3. To help parents plan their child's path to bilingualism, educators and policymakers must increase the availability of second language and heritage language programs in public schools.

Article 2.2. Language Learning in a Multicultural Society, by Katherine S. White, and Suzanne Curtin

1. Children may not understand words in a new accent at first, but having a strong language foundation will enable them to discover the relationship between new accents and their own.
2. Experiences most supportive for building children's language knowledge are those grounded in social interactions with others, including interactions conducted over screens or while wearing masks.
3. Educators should recognize the diversity of children's language backgrounds and that their own language background may be different to those of the child with whom they are working. With this understanding, educators can ensure that they provide enough support to help children acclimate to the classroom language environment.

Article 2.3. COVID-19 and Heritage Language Learning, by Asma Afreen and Bonny Norton

1. Educators and policymakers should collaborate to ensure that heritage and minority languages have greater legitimacy in Canadian school curricula.
2. Since multiculturalism is a fundamental characteristic of Canadian society, federal and provincial policy and funding should support heritage language programs such as community language schools.
3. Parents and teachers should encourage children to maintain their heritage languages and multilingual identities. This will strengthen relationships between schools and communities, while promoting Canada's social, political, and economic connections with the global community.

Article 2.4. Virtual Visits: Indigenous Language Reclamation During a Pandemic, by Daisy Rosenblum

1. The COVID-19 pandemic has foregrounded the fundamental necessity of online connection for all Canadians. High speed internet access and other digital infrastructures must be treated as basic infrastructure, made accessible and equitably distributed across all remote and rural communities.
2. Educators and policymakers should work together to ensure that Indigenous languages and cultures are represented and included at every level of public education, and to provide funding to support the inherent right of Indigenous children to learn and speak their heritage languages.
3. All Canadians can deepen their knowledge of the Indigenous languages which are located in the places where they live, the communities in which they are spoken, and the language revitalization efforts underway in these communities.

Article 2.5. Promoting Second Language Learning During the COVID-19 Pandemic: Parents' and Teachers' Coping Strategies, by Guofang Li, Roksana Dobrin-De Grâce, Zhuo Sun, Meishi Haslip, Diana Burchell, Julia Rivard Dexter and Xi Chen

1. Teachers and parents should continue to seek ways to collaborate and co-educate by building on what they are already doing in their separate spaces. Home journaling and school writing can be coordinated, allowing students to use all of their language repertoires.
2. Parents and teachers should also work together to support their children to form out-of-school reading clubs to promote reading and social interaction.

Article 2.1. The Benefits of Being Raised Bilingually

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Canada is an officially bilingual country in English and French, with a multilingual population that speaks more than 200 different languages (Statistics Canada 2017). In large cities such as Montreal, Toronto, and Vancouver, around 25% of children grow up in bilingual households (Schott et al. 2019). Many more children encounter a second language as they enter childcare and school, for example learning English or French if they speak a different language at home, or acquiring a new language through school programs such as French immersion. The value of bilingualism is more salient now than ever, as the COVID-19 pandemic has highlighted the interconnectedness of communities and the importance of being able to communicate in multiple languages to solve the world's most pressing problems.

Despite the prevalence of childhood bilingualism and the benefits of speaking multiple languages, raising a bilingual child can be a fraught issue for many families. Parents often worry about the consequences of bilingualism, and they wonder whether and how their children will become successful bilinguals (Ballinger et al. 2020). The COVID-19 pandemic offers both challenges and opportunities for parents raising bilingual children, providing some lessons that may be useful post-pandemic. Using evidence-based facts from scientific research, we address some of parents' most common questions about raising bilingual children.

What does it mean to be bilingual?

A persistent myth about bilingualism is that people need to speak two languages *equally* and *perfectly* well to classify as bilingual. This antiquated assumption only captures a small proportion of people around the world who use two or more languages regularly, and it has caused many to downplay or deny their identities as bilinguals (Grosjean 1992). In truth, some bilinguals will be equally proficient in each of their languages, while others will be more proficient in one language than the other. Moreover, language skills may vary across modalities. Some bilinguals will be able to understand, speak (or sign in the case of languages like American Sign Language), read, and write in each of their languages. Others will have a language that they understand but do not speak/sign or read. The type of bilingualism individuals achieve is based on the context in which they've learned their languages (e.g., at home or at school), and their motivations for using them (Weinrech 1953).

Bilinguals can also be characterized based on when in life they learn their languages. Some bilinguals learn two languages from birth (also called *simultaneous bilinguals*), while others will

have a more gradual journey in learning their second language (also called *sequential bilinguals)*. While no type confers a superior status of "being bilingual" over the other, there is some indication that for learning a second language, individuals who start learning earlier tend to become more proficient and are less likely to speak with an accent. Not only are younger brains biologically more receptive to learning languages (Johnson & Newport 1989), infants and young children are also immersed in supportive environments that promote language learning (Byers-Heinlein & Lew-Williams 2013). For instance, in many cultures, infants receive constant one-on-one interactions with their caregivers, who talk to them in an attention-grabbing and clear manner.

Does bilingualism confuse kids?

Many children grow up in homes where multiple languages are spoken, but some parents may hesitate to expose their babies to two languages out of concern that it will be too confusing for them. Certainly, if kids are not able to separate their two languages, it's reasonable to worry that this will slow their language development.

Amazingly, children are quite adept at distinguishing between multiple languages from a very early age, using both visual and auditory information. For instance, even without sound, infants can tell languages apart by observing mouth movements and facial expressions, as these look quite different across languages (Sebastián-Gallés et al. 2012). Likewise, languages vary in their sound and rhythm, and they have different rules about how words go together. Babies are sensitive to these differences, enabling them to tell different languages apart soon after birth (Byers-Heinlein et al. 2010; Narca Garcia et al. 2018; Orena & Polka 2019). Preschool-aged children adapt their speech to the language of monolingual strangers, further showing that kids can distinguish between two or more languages from early on (Genesee et al. 1996).

Studies on language acquisition overwhelmingly suggest that hearing two languages simultaneously is as natural as hearing one. For instance, the developmental timing of changes in speech perception is strikingly similar across monolingual and bilingual infants (Höhle et al. 2020). They can identify the sounds, rhythm, and rules of their native languages at similar time points as monolinguals with their single language. Hearing two languages does not confuse babies; rather, it prepares them to learn and use these languages later in life.

At the same time, there are some unique features in the process of acquiring more than one language. For example, because their vocabularies are split across two languages, bilingual children will sometimes know fewer words in each language than a monolingual child will know in their single language (Gonzalez-Barrero et al. 2020; Thordardottir 2011). Importantly, the total number of words bilinguals know across both languages is the same if not more, suggesting that monolinguals and bilinguals are learning at the same rate, and differences arise bilinguals simply have more to learn (Core et al. 2013; Hoff 2018; Höhle et al. 2020; Gonzalez-Barrero et al. 2020).

Bilingual children also have unique behaviours, like mixing their languages when speaking. Rather than being a sign of confusion, this usually means that bilingual children are using all of the language resources they have available to communicate, a process some linguists refer to as "translanguaging" (García & Wei 2014). Language mixing or translanguaging is therefore not cause for concern, but a cognitive strength that demonstrates bilingual children's ability to flexibly integrate all of their linguistic repertoire to communicate (Li 2018).

Is bilingualism good for kids or bad for kids?

Since learning two or more languages may require additional effort, many parents worry that bilingualism will delay or impair children's normal social, cognitive, or academic development. In fact, bilingualism does not cause impairment or delays. On the contrary, it has many advantages and benefits.

First, ample evidence has shown positive transfer between the two languages, be it between similar languages (e.g., English and German) or languages of different scripts (e.g., Chinese and English). That is, children's knowledge of one language (such as grammar, vocabulary, and meaning) often helps when they learn a second language, and vice versa (Li & Yang 2015; Li et al. 2019).

Second, bilingualism can make children's brain muscles more cognitively flexible in that it helps their brain to better respond to changes, develop stronger memory skills, and better control focus and attention span (Bialystok 2011; Gunnerud et al. 2020). For example, a study that compared bilingual and monolingual children's development since infancy found that bilingual children can accumulate greater cognitive advantages than their monolingual peers beginning at the age of nine months and these advantages carried over in their math and literacy development at the age of 4 (Sun 2011).

Finally, bilingualism enables children to develop better socioemotional skills. In a study that included a national sample of young Latino children in the U.S., fluent bilinguals and those with higher proficiency in Spanish surpassed every other group with the highest levels of socioemotional well-being including aspects such as approaches-to-learning, self-control, and interpersonal skills and had the lowest levels of behavior problems (Han 2010).

That said, some bilingual children will struggle with acquiring language, and they may be diagnosed with a language impairment or delay. Importantly, research has shown that bilingualism does not cause the impairment, and such children would likely have had the same challenges if they were monolingual (Genesee et al. 2020). Yet, bilingualism can make it more difficult to detect language impairments and delays because it is harder to assess bilingual children, as assessments must consider both languages together and many professionals lack the training or language knowledge to fully assess bilinguals (Peña et al. 2016). That is, a bilingual is not "two monolinguals in one", and bilingual children's development may not follow that of monolinguals in either of their languages, making it harder to know when their development is atypical (Grosjean 1989; Thordardottir 2011). For this reason, bilingual children with possible language difficulties can be both over-diagnosed and under-diagnosed (Bedore & Peña 2008).

Parents who have concerns should seek advice from professionals with expertise in bilingualism and language impairment as soon as possible. Moreover, for those children who are diagnosed with a language impairment, current research does not support the popular notion that their difficulties will be exacerbated by bilingualism. Rather than giving up one of their languages, experts currently recommend that children with language impairments receive extra support in acquiring both of their languages (Paradis 2007).

What is the best way to raise a bilingual child?

There is no one best way to raise a bilingual child: every child has their own path to bilingualism depending on their family's language use, the languages spoken in their community, and the

other opportunities they might have for encountering and using different languages (Grüter & Paradis 2014). Developing skills to communicate in multiple languages takes time and effort.

Exposing young children to multiple languages early on is an effective way to start the bilingual learning process (Byers-Heinlein & Lew-Williams 2013; Paradowski & Bator 2018), and parents who are bilingual themselves can speak to their child in multiple languages from birth. At the same time, children (and adults for that matter) can learn a new language at any age. For example, school-aged children are able to learn a new language relatively quickly through immersion programs (Genesee 2015; Muñoz 2014).

Regardless of when language learning starts, children learn language from high-quantity, high-quality interactions (Byers-Heinlein & Lew-Williams 2013; Tabors & Snow 2001). In terms of quantity, perfectly balanced "50%/50%" exposure to each language is very rare amongst bilinguals, but research suggests that exposure of 30% per day or per week to a second language is likely sufficient to support active bilingualism (Thordardottir 2011). In terms of quality, children learn best from real individuals who interact contingently with them, rather than TV or other media such as apps. Children's language learning benefits from opportunities to interact with fluent speakers—whether adults or their peers—especially when they use rich vocabulary and varied, complex sentences (Genesee 2015; Place & Hoff 2016).

Families who are committed to bilingualism may consider making a plan for how they will expose children to multiple languages in ways that are both high quality and high quantity. One of the most frequently implemented methods is the one-parent-one-language approach where each parent uses a different language—this can certainly be an effective strategy for many families. Another popular strategy is to speak one language at home and another language outside the home, which can be particularly beneficial when children have few other opportunities for exposure to the home language (De Houwer 2007). Families can develop their own strategies that make sense for them, as there is no evidence that particular strategies are better than others beyond the opportunities they afford children to hear and use their languages. Families need not feel restricted to one strategy over another, especially given that methods of exposure will need to change and evolve as children become older and more proficient bilingual speakers, or as external factors change children's language exposure and needs. Strategies for ensuring high quality and quantity of bilingual exposure should be applied flexibly in ways that best support children's current abilities in each language.

Pandemic-related restrictions may have affected some families' language plans for their children. For instance, bilingual children whose exposure to one of their languages was primarily at school may be affected by the shift to online learning. In some cases, this shift has decreased their overall exposure to that language, as well as the added challenge of learning or maintaining a language primarily through online interactions. On the other hand, the same restrictions may present other opportunities, for example in relation to heritage languages that are not spoken in the wider community, which will often need extra effort to achieve high-quality bilingual experiences. Pandemic-related restrictions have had the benefit of increasing the time that families spend together, giving additional opportunities for children to interact in the heritage language. Being able to plan for and adopt different family language strategies is helpful both during the pandemic and beyond.

To maintain languages that need extra support, families can seek out activities that promote high-quality, high-quantity talk. In particular, children's storybooks provide exposure to richer and more diverse words than everyday conversations, which boost vocabulary skills (Flack et al. 2018; Roberts 2008). Free online resources such as Storybooks Canada (https://storybookscanada.ca) offer storybooks in more than 30 different languages. Language experiences outside the home, although more limited during the pandemic, can also enhance children's language experience, for example visiting family members who speak the heritage language or participating in community events such as free library programs or cultural festivals. When activities outside the home are less feasible, research indicates that online interactions such as videoconferencing with grandparents and extended family can also benefit children's language learning (Myers et al. 2017; Roseberry 2014).

Conclusion

Parents face many questions when thinking about whether or how to raise their children bilingual. We hope that families can be guided by the scientific research we have presented here, rather than many of the popular myths and personal opinions that abound about early bilingualism.

Raising bilingual children is not an easy task as it requires persistent effort and continued time and familial investment, sometimes from infancy. Parents often face difficult decisions that involve tradeoffs between their children's bilingualism and other important aspects of their development and well-being, an issue that has become particularly salient during the COVID-19 pandemic. For example, a particular language program might only be available at a school that involves a long commute, or insisting on using a particular language might cause embarrassment or conflict for certain adolescents. Ultimately, parents will need to balance their bilingualism goals within their current context with other family priorities. Educators and policymakers have a role to play in reducing the need to make these difficult choices, for example by increasing the availability of second language and heritage language programs in public schools, and by promoting positive attitudes towards bilingualism.

Children fortunate enough to grow up bilingual will benefit from having the ability to communicate in multiple languages—a skill that is advantageous across personal, social, and professional contexts (Byers-Heinlein & Lew-Williams 2013; Paradowski & Bator 2018). Bilingualism—in all its varied forms—is an enriching experience that can open up a world of possibilities for children in Canada's post-pandemic future.

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Article 2.2. Language Learning in a Multicultural Society

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Every day we experience much of the world through language, whether spoken, signed, or written. Language forms the basis of our social interactions and enables us to transmit information to one another (as in the text you're reading now). In a way, this pandemic has made us even more reliant on these language-based interactions, because there are fewer people to smile at while walking down the street, and we can't just sit in a crowded coffee shop and let the sights and sounds wash over us. Much of our interaction with those outside our immediate circle has moved online, and these interactions are often entirely verbal—especially when cameras are turned off. These social changes have altered the nature of our language experience. Physical distancing means that we hear language in person from a narrower range of people. And, even when we do have in-person interactions, masks can affect the quality of the visual and auditory information transmitted. What are the consequences of these changes for children's language development? Here, we focus on the implications of this changed experience for a particular aspect of language learning—children's ability to understand different varieties of their language.

In order to understand the implications, let's first consider the magnitude of the task facing a young language learner. (Although we focus here on children learning spoken languages, the situation is similarly complex for children learning signed languages.) Infants are not born knowing how to speak, or how to understand the language around them. They are born into an auditory world that is highly complex. There are environmental sounds, such as cars and running water, and there are sounds that humans produce, such as speech (but also sneezes and hiccups). An infant's first task is to separate human vocalizations from other sounds so that they can begin to pull meaning from the string of sounds they are hearing. Infants demonstrate a preference for human speech over these other sounds from birth (Vouloumanos & Werker 2007) and this helps to set the stage for language acquisition.

But even the speech signal itself is highly complex. The sounds that young children hear while learning their native language(s) are highly variable and influenced by a number of factors, such as who is being addressed. For example, a caregiver interacting with an infant speaks to them in a different way than they speak to other adults. The way a sound is produced is influenced not only by who is listening, but also by the speaker's age and gender, as well as the specific word context that the sound appears in. So, an infant must somehow figure out that the word *baby* is the same whether it is spoken by her mom, her dad, or her grandma. We still don't know quite how they do it, but infants figure this out surprisingly early—within the 1st year of life. For example, by 6 months, infants can tell that a "b" before the vowel "a" is the same sound as a "b" before the vowel "u", even though they are acoustically different (Hochmann & Papeo 2014). And by 6-10 months, they can tell that words are the same when they are spoken by people of different genders (Houston & Jusczyk 2000; van Heugten & Johnson 2012). Around the same time, infants are tuning in to the unique properties of their native language—learning which sounds are in their language (Werker & Tees 1984), what the rules are for putting those sounds together to form

words (Jusczyk, Luce & Charles-Luce 1994), and even what specific words mean (Tincoff & Jusczyk 1999; Bergelson & Swingley 2012).

Even learning a single language system is an impressive feat. But in a country like ours, children will almost certainly hear a variety of languages and accents in the speech around them. 19.4% of Canadians speak more than one language at home (Statistics Canada 2017) and 21.9% have moved here from another country (Statistics Canada 2017). Even those of us who speak the same language may not do so in the same way. This rich linguistic tapestry creates a spectrum of language experiences for our children. Some children will grow up bilingual or multilingual. In addition to being exposed to more than one language, these children will very likely hear multiple variants of their languages (such as a French-English bilingual who is also exposed to French-accented English and English-accented French). Some children learning a single language may still grow up exposed to multiple accents, if, for example, their parents speak different varieties of that language (like Canadian and British English). And still others will be raised primarily with a single language and accent, but may be exposed to other accents in their social and educational interactions.

What does this language variation mean for children's early language development? Although our understanding of how children learn more than one language has grown in recent years, much less attention has been paid to how exposure to different varieties of a single language might affect language learning. We all speak with a particular accent, our unique signature that reflects our language history. One noticeable difference between accents is in the melody. For example, the emphasis on certain words, or the overall melody of a sentence might sound different across varieties (in Canadian English, we say LABoratory, but in British English, the word is pronounced laBORatory, with the strongest syllable a bit later in the word). There are also differences in the way that specific speech sounds are produced. For example, in order to tell apart the English words *pear* and *bear*, we must be able to distinguish the sounds "p" and "b". But a person speaking English with a French accent might produce "p" more like an English "b". How do listeners deal with these kinds of changes?

Children who are growing up exposed to multiple accent varieties regularly in their environment are facing a task that is, in some sense, similar to what a bilingual child encounters (Albareda-Castellot, Pons & Sebastian-Galles 2011). However, bilingual children are learning systems that often differ at not just the sound, but also the grammatical and word levels. The task for a bilingual child is to separate their two systems and learn about the properties of each (something we know they can accomplish quite early). In contrast, children hearing multiple varieties of the same language must map this variation on to the same language system. Although there is not much research in this area yet, there are indications that toddlers, and even infants, can track pronunciations of a word from speakers with different accents and realize that they mean the same thing (Weatherhead & White 2016; van der Feest & Johnson 2016). Infants who are from homes in which multiple accents are spoken may also be more tolerant of variations in the pronunciation of familiar words than infants from a single accent environment, suggesting a flexibility that is similar to bilinguals (Durrant et al. 2015).

What happens if an infant is, instead, exposed to a single accent variety during the first year of life, when they are tuning to their native language, and later encounters a person who speaks differently? In this case, how might an English-learning child avoid mis-identifying a French speaker's *pear* as the word *bear*? Over the course of development, infants become increasingly

better at accommodating speech that isn't quite what they are used to hearing. For example, in very simple auditory tasks, 9-month-olds cannot recognize that words are the same when they are spoken by people with different accents, whether this is because they speak a different dialect of English (like American Midwest vs. Canadian English) or have a different native language (like Spanish-accented English; Schmale et al. 2010). But by 12 months, they can. In fact, they can even learn the meanings of new words that are produced in an unfamiliar accent, as long as these words follow the rules of English (Mackenzie, Curtin, & Graham, 2012). These findings show that as infants gain more experience with their language, they are better able to recognize words produced in new ways. Language experience might help by exposing children to a greater range of pronunciations (even within their own accent). This, in turn, might enable them to form more robust representations of words that can be recognized across accents (Best et al. 2009).

However, age and general language experience are not the only things that improve children's ability to handle accents that differ from what they are used to. Exposure with a specific accent can help, too. It might be useful to think about your own experience when you encounter a person speaking in an unfamiliar accent. At first, you may have a bit of trouble understanding what is being said. But then it clicks and your brain figures it out.

The same is true for young children. For example, if toddlers are presented with a picture of something familiar, like a dog, and hear the name produced in a novel way (for example, *dag*), they won't look at the dog picture at first. But they will learn this new pronunciation, and begin to look at the dog, after hearing it just a few times. Even more impressively, if they hear multiple words following the same pronunciation pattern, they are able to figure out the general rule between this new accent and their own (that there is a change of vowel). This knowledge enables them to later understand words in that same accent that they have not heard before (White & Aslin, 2011). In other words, if children have some sense of what the speaker is trying to say (in this case, because they see a picture of a dog), then they can figure out how the new pronunciations map onto the system they have been learning. Children can also figure this out if they hear a highly familiar story in a new accent, since they know what the words are supposed to be (van Heugten & Johnson, 2014). As children get older, they may be able to use other sources of information as well, such as where the word is in a sentence and the context of the topic being discussed. Children are capable of using a variety of clues to infer what word a speaker is trying to say, and can use this to crack the code of how the speaker's accent is different from their own.

Of course, children should not assume that everything they hear is a variety of their native language. Indeed, Canada's multicultural landscape contains a multitude of languages in addition to accents. So, a child must determine whether what they are hearing is a variant of their own language or a different language that they should not attempt to process in the same way. We know that even very young infants can tell the difference between languages, especially those with different melodies, like English and Japanese (Mehler et al. 1988). Infants can use this kind of sensitivity later on, when they are learning words, to figure out what they should do. If English-learning infants hear a new word, like *sika*, pronounced with an unfamiliar Japanese accent, they can learn the meaning of that new word. In this case, without any context, they might imagine that the word *sika* is a possible English word produced by a speaker with a different accent. But, if they hear a passage spoken in Japanese prior to being taught this new word, they will not learn it. When it follows a Japanese language context, they no longer treat it as a possible English word

(San Juan et al. 2019). This is yet another example of infants using the context in which they hear different words to decide how to interpret them.

Living in a multicultural, multilingual country provides us all, including the youngest among us, with a rich language experience. Children experience a range of different speech styles, accents, and languages over the course of their development and must figure out how to interpret this variation. As we've seen, they have quite a remarkable ability to do so.

Children's interactions are now more limited in some ways, to physical contact with a small family circle and in-person conversations with others often conducted through masks. How might this affect their developing ability to cope with different varieties of their language? One obvious consequence of masks is that they block access to visual speech information. Infants and children do attend to visual speech when people are talking (Morin-Lessard et al. 2019) and such visual speech can influence language processing (Weatherhead & White 2017; Havy et al. 2017). However, visual speech is available in settings where masks are not required, such as in the home. And these in-person interactions can be supplemented by video chats with family, friends, and teachers from all over the world. Although it is natural to be concerned about the impact of this increased reliance on technology, we do know that quality video interactions can support children's social relationships and learning (Gaudreau et al. 2020). A second consequence of masks is that they can lead to some muffling of the speech signal (Corey et al. 2020). For this reason, it's important that adults make an effort to articulate more carefully when speaking to children through masks.

So should we be worried about how these changes will affect children's ability to cope with linguistic diversity? Some children will continue to be exposed to multiple varieties of language in their daily lives. Others will have exposure to a narrower range of speakers than they might under more typical circumstances. However, as we have discussed, one important predictor of children's understanding of new language varieties is their developing experience in their own variety. This means that if children continue to develop their language knowledge by interacting with those around them (masked or not) and in their video chat environments, they will be well equipped to deal with any new varieties they get exposed to later.

Children's language learning is surprisingly robust to different environmental conditions. Depending on their input, children learn one language or more languages, spoken languages or signed languages, and they learn on similar timetables across the incredible diversity of the world's cultures and languages. When we all have the opportunity to gather again, we will hopefully better appreciate the vibrancy of our diverse communities and the linguistic and social experiences they give our children.

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Article 2.3. COVID-19 and Heritage Language Learning

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The Canadian census of 2016 highlights the multilingual character of our country, in which over 7 million people speak a mother tongue other than the official languages of English and French (Statistics Canada 2017). While parents in such homes want their children to learn Canada's official languages, to be successful at school and in the workplace, many are also eager for their children to maintain the parents' mother tongue, or heritage language, not only as a linguistic resource, but also as a marker of identity. Several studies (see Duff & Becker-Zayas 2017) have reported that diverse ethnolinguistic communities have shown enthusiastic support for heritage language maintenance and have established heritage language programs in many provinces of Canada. Our research site, the Vancouver Bangla School, is one such program, established by the Greater Vancouver Bangladesh Cultural Association in 2018. This community school offers free Bangla language classes on a weekly basis to Canadian Bengali children. Parents of the children who attend the Vancouver Bangla School are mostly Bangladeshi Canadian immigrants, and while they are native speakers of Bangla, English is the dominant language of their children.

One intriguing development resulting from the pandemic lockdowns has been the increased interest in heritage language learning around the world. An article in *The New York Times* in September 2020 (Hardach 2020), has noted that, as a result of lockdowns, children are spending more time with their parents, and for children in multilingual families, there has been greater opportunity to hear their parents speak the heritage language. The article notes that increased enthusiasm for heritage languages has been found in Germany, Britain, the United States, Norway, and Uganda.

Rather than studying language practices in the home, we are interested in the way community-based language schools are adapting to the pandemic. Following the interruption of in-person learning at the Vancouver Bangla School in March 2020, teachers at the school reached out to the Greater Vancouver Bengali community via Facebook to share plans of moving online. Parents' and children's enthusiasm for heritage language learning during the pandemic was evident when twenty-one students (children aged 6-14) registered for the program. The school reopened virtually in June 2020, providing free online Bangla classes.

In the fall 2020, we received a Mitacs Research Training award, jointly offered by Mitacs and UBC Language Sciences, and began a case study to investigate how teachers from the Vancouver Bangla School are transitioning from in-person to online teaching during COVID-19. Currently, the school has four volunteer teachers including co-author Afreen. Drawing on theories of identity and investment (Darvin & Norton 2015; Norton 2019), translanguaging (García & Li Wei 2014), and multimodality (Kendrick 2016), our research seeks to identify what challenges the teachers have experienced in the transition to online heritage language teaching and what translingual and multimodal resources they use to promote the active participation and investment of language

learners. The data sources include participant class observations, field notes, questionnaires, semi-structured interviews, and focus group discussions with teachers. Data is being analyzed using NVivo 12, a qualitative data analysis computer software.

Since English is the dominant language for children at the Vancouver Bangla School, our research has found that teachers and children use both Bangla and English flexibly to facilitate children's Bangla learning. Teachers co-teach in the online session and collaborate to solve technical challenges. Teachers also support one another in creating resources, using available resources from their homes and the online context to make language learning interactive and engaging. Teachers make flashcards to show colors and Bangla letters, screen share photos from books or the Internet, and use PowerPoint. They also encourage children to show their toys, drawings, books, stories, etc. and discuss the artefacts with the class. The lead teacher uses the Zoom whiteboard to teach Bangla letters creatively. Sometimes parents sit beside their children and assist them in writing. The collaboration among teachers, children, and parents makes the online class engaging and lively.

To complement the educational resources that teachers create, we introduced free digital educational resources to the parents, teachers, and students. These included the Global Storybooks project (globalstorybooks.net/), which includes Storybooks Bangladesh (global-asp.github.io/storybooks-bangladesh/), and Storybooks Canada (storybookscanada.ca) (Norton, Stranger-Johannessen & Doherty 2020). These free online resources have illustrated stories in a wide range of immigrant, refugee, and Indigenous languages in Canada, as well as English and French. Most languages are available in audio and have a toggle feature that enables language learners to transition easily from one language to another while reading a story. Afreen was active in the development of Storybooks Bangladesh, doing both the translations and audio for 40 stories on the site.

Our research identified two important findings associated with online heritage language learning and teaching during the pandemic. First, online teaching has enabled the school to reach the wider Bengali community, both locally and nationally, transforming itself from an urban centre to a virtual provincial and national site. Not only did the number of students increase when the school went online, but the participating students reside in different parts of BC, as well as in Ontario. Second, although parents acknowledge the benefits of face-to-face teaching, both teachers and parents highlight commuting time as a significant challenge in face-to-face teaching. Our study demonstrates that online learning may enhance the opportunities for historically underserved communities to connect and collectively strengthen heritage languages.

The practices of the Vancouver Bangla School may be of interest to other communities that wish to support heritage language learning both during and after the pandemic. The Bangla community has harnessed online teaching and digital innovations to encourage children to embrace bilingual and multilingual identities, thus enriching communication in families and communities. The school has been able to accomplish this with dedicated volunteer teachers, free digital educational resources, and a committed parent community. Such learning bodes well for a post-pandemic world in which multilingual communities can strengthen heritage languages and identities.

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Article 2.4. Virtual Visits: Indigenous Language Reclamation During a Pandemic

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How long has it been since you had a neighbour over for tea, sat around a table with friends, or let your kids visit their grandparents? One of the most pervasive and widely shared losses of the COVID-19 pandemic is the experience of visiting with relatives and friends. In pre-pandemic times, visiting was a routine part of our social lives. Now, the pandemic has taken many of those small social moments away, and we all miss them. Casually stopping by, sharing a meal, bringing a gift: those are life-sustaining activities -- except when they also bring a risk of infection with COVID-19.

For Indigenous communities, not being able to visit is a profound loss. Indigenous communities in North America have borne some of the greatest burdens of this pandemic. In the U.S., where infection and transmission are rampant, Indigenous Americans have suffered the highest death rate from COVID-19, nearly twice the rate of White Americans. (APM Research Lab 2021) First Nations Reserves in Canada report 40% higher rates of infection. Canadian government surveys indicate disproportionate impacts on the economic well-being and mental health of Indigenous people. (StatCan 2020) Jodi Archambault described the devastating loss of her uncle Jesse Taken Alive, a speaker and champion of Lakota and Dakota, to COVID-19, along with his wife Cheryl and three more speakers who helped teach the language: Paulette High Elk, Delores Taken Alive, and Richard Ramsay. (Archambault 2021) As Jesse and Cheryl's oldest son Ira Taken Alive said, "It takes your breath away. The amount of knowledge they held, and connection to their past." Communities are reeling from these vast losses they have experienced and are focused on preventing further pain. Thankfully, health services to US tribes have now prioritized Elder speakers of Indigenous languages for vaccination; farther behind on the curve, Canada has prioritized Elders on some First Nations Reserves. But aside from the direct threat of COVID-19, the pandemic introduced another danger to the hundreds of Indigenous languages spoken in Native North America and struggling to survive: Indigenous Language Revitalization programs rely on *visiting* in many forms to do their work.

The pandemic, with its requirement that visits be on a computer, rather than in each other's living rooms, inhibits connections with Elders who do not have wi-fi or know how to use a computer. Nevertheless, those involved in Indigenous language revitalization programs have carried on and found innovative ways to continue visiting safely. Some of these new approaches have expanded horizons for language revitalization in the present and future.

Pandemic Challenges

As Marianne Ignace says of her work with both Secwepemcín and Haida, "There is nothing in my mind that compares to being able to sit with Elders in person as we do language work." Robin Rosborough and Michelle Hinatsu, two teachers tasked with recording with Elders and creating language curriculum for the Gwa'sala-'Nakwaxda'xw Elementary School, used spend hours each week recording Bak'amk'ala with speakers. They made daily visits to classrooms where they shared

language with the children and teachers. But they haven't been able to visit the school since March 2020, and they express profound sadness about not being able to be with the children at the school. Where the school used to be a place where conversations and laughter could be heard in Bak'wamk'ala, it is much less so these days. Children and teachers miss hearing the language during their school day. Language teachers and learners feel keenly the loss at not being able to be physically present with their Elders, who are also beloved relatives. (Hinatsu & Rosborough 2021, p.c.)

Although possible, recording at a distance introduces multiple challenges. Operating a recording device and ensuring good audio is infinitely easier to do in person than remotely. Technology has many ways to fail: internet access may be limited or unreliable; Elder speakers may not have devices and may be unfamiliar with how they are used or uninterested in learning; sound quality depends on the software settings, the location of a microphone, or the strength of a connection. Language revitalization programs have had to draw on strategies of resilience to maintain their hard-won momentum and maintain the work of documenting, teaching, and learning Indigenous language as a community priority.

Bagwa̱nsap'a̱ns laxa̱ Zoom ('We visit with each other on Zoom'): Virtual Collaboration

Remote communication has become an essential tool for many of us in working from home, and language programs are no different. When the pandemic began, the Gwa'sala-'Nakwaxda'xw Language Revitalization Program on Northern Vancouver Island had just secured funding to start their first full-time cohort of Adult Immersion Learners of Bak'wamk'ala. Like so many who have adopted video conferencing to continue working, teachers and learners in this program and others pivoted to Zoom for their program meetings, their work with Elder speakers, their curriculum development, and their community language classes. Where necessary, program coordinators and school administrators purchased devices for Elders, coordinated with relatives in Elders' homes to facilitate connectivity, and continue to troubleshoot technical challenges. Holding language classes online has expanded access to a diaspora of community members living far from home. Lucy Hemphill, GN Language Program Coordinator, says she and the program team live their lives online right now; it is exhausting but also rewarding and productive. (Hemphill p.c.) A Secwepemc language group also used Zoom for weekly meetings to record new documentation and translate archival material, beginning with phrases related to the pandemic. Facilitating participation sometimes required Dr. Ignace to physically rush to Elders' homes, masked, physically distanced and sanitized, to reset tablets, connect them to wifi, and hand them back before returning to her own home half a mile down the road to begin the work session. (Ignace, p.c.)

@ktunaxapride and #KeepOurLanguagesStrong: Using social media to stay connected and share language.

Everyone misses being able to learn together in person, but virtual and digital tools and platforms have allowed language learning to be shared more broadly with community members living elsewhere. Prior to the pandemic, social media was already an active space for gathering and sharing language through Facebook pages and groups, Twitter feeds and hashtags, Instagram accounts and videos posted to TikiTok and YouTube to promote language use in the home, share lessons, and nurture humour and joy in the process of learning. The NETOLNEW Research Partnership at the University of Victoria found a 64% increase in use of social media among Indigenous Language Revitalization (ILR) programs resulting from the pandemic (McIvor

et al. 2020), and identified hashtags such as #KeepOurLanguagesStrong (Chew 2020), and the #2020IndigenousLanguagesChallenge created on Facebook by Raymond Braveowl to build solidarity and support among those focused on language revitalization (Braveowl 2020). Just among teachers, learners, and programs focused on revitalizing Kwak'wala and Bak'wa?mk'ala, at least a dozen new groups and pages have mobilized over the past year to share calendars, words of the day, videos of families learning together outdoors and indoors, pronunciation practice, seasonal phrases for Christmas and Valentine's Day, and even labels with audio-embedded QR codes for posting around the house. The K'wala Language Program instagram account shares glimpses of their online process of language learning with Elders. Videos and audio shared through Instagram, TikTok and Youtube help learners with pronunciation, showcase creativity with puppets, animation, and storytelling, and provide inspiration and care for fellow learners. The @ ktunaxapride account on Instagram created by Aiyana Twigg, a UBC student in the First Nations and Endangered Languages Program, shares her Ktunaxa language with the diaspora of learners living on both sides of the US-Canada border which splits her territory. Ferrin Yola Willie, a PhD student, Kwak'wala learner, and mother of three, noted that even as she created videos for to share with other learners on Facebook, spending more time at home and with family prompted her to move her language work into her home, and that this is where language is meant to live. (Willie, p.c.)

Kaangaxtolaan's awi'nagwis (Knowing our land): Outdoor and land-based learning

The pandemic began just as we were emerging from winter in the Northern hemisphere. For many Indigenous communities living in their territories, traditional activities of gathering, harvesting, and processing food begin in the spring and take precedence over other activities through the summer and fall. Last March, as Indigenous communities across Canada closed their borders and turned inward to protect themselves, they also turned their attention to the land. Like many involved in language revitalization, Hemphill shifted her focus toward food sovereignty, planting community gardens and sharing cultural practices of gathering and processing food and medicine from the Gwa'sala-'Nakwaxda'xw territories. As weeks wore on into months, and as we began to understand more about the virus and the lower risk of transmission outdoors, many language workers identified opportunities to integrate language 'hunting' with other activities out on land and water, and documented this with videos shared on social media. Masked and socially-distanced, learners and elders picked berries on forest walks, dug clams on beaches, and built land-based language lessons for children at the elementary school and adults in the immersion program. This language program and many others were already poised to focus on outdoor learning because of the close relationship between language and land, and the powerful connection community members feel to language and land together: their language comes from their land and is uniquely suited to describe the features of their territory. For Elders who attended residential school, Bak'wamk'wala can be difficult to access within the four walls of a classroom, but easier to recall on a beach or in a forest. Land-based learning is not a new mode for language revitalization, but where community programs have been able to safely implement outdoor visiting, and where Elders were able to participate, the past year expanded everyones' ability and experience in these methods.

Wiga'xan's 'wi'la yaḱant'ala san's yaḱandas (Let us all speak our language!)

Much depends on practicalities that may seem quotidian: access to reliable internet, devices and tools, technical proficiency and comfort with new technologies. It has been crucial for funding

agencies such as First Peoples' Cultural Council to understand and permit reallocation of funding to meet new needs such as purchasing devices for Elders and facilitating connectivity. (FPCC 2020) However, the pandemic has shone a spotlight on a persistent digital divide in Canada, and highlights a need for internet access to be treated as a fundamental utility and basic right, like power and potable water.

By limiting safe options for language learning, the pandemic forced language programs to move learning online and outdoors. As a result, teachers, learners, and speakers increased their fluency in the tools, technologies, and strategies that can facilitate and strengthen language use and nurture relationships through remote communication. Several of the Kwak'wala and Bak'wamk'ala language workers I know have expressed appreciation for the ways the pandemic prompted them draw on their community's existing resilience to innovate creative strategies for continuing their work. And yet, while Indigenous language revitalization programs have expanded toolkits and capacities, communities grieve the losses of this past year, especially their beloved kin and the joy of shared physical presence. Several Kwakwaka'wakw communities await a vaccination plan and language teachers and learners urgently hope for the day when they can safely visit with Elders in person and press 'record'. The work of language revitalization asks community learners and teachers for a daily commitment to incremental, iterative progress, even as they are sustained by the thread of connection to past and future. For non-Indigenous Canadians, these languages, their vital importance, and the connection to territory, may seem remote. I suggest starting by finding out about the Indigenous languages which belong to the places where you live. Look for Indigenous names for the places you know best, and see if you learn how to say a greeting. (McIvor 2018) If there is a revitalization program, see if you can contribute towards their work. Wherever you are, you can acknowledge the living languages and the stewards who carry it forward for future generations.

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Article 2.5. Promoting Second Language Learning During the COVID-19 Pandemic: Parents' and Teachers' Coping Strategies

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Abstract

The COVID-19 pandemic has drastically reduced social interaction, changed the way educators teach, and increased screen time for children. These changes have been especially challenging for students who are second language learners. Drawing on two research studies conducted in Vancouver and Toronto, this article shares parents' and teachers' reports of the challenges and coping strategies in supporting their children's social and academic language development in school and at home during the pandemic. While teachers reported using many best teaching practices that focused on making academic language and instructional materials accessible for diverse learners, exploring new technology tools for meaningful instruction, and increasing communication with parents, parents showed many useful and creative strategies such as maintaining a reading and writing routine, creating opportunities to increase peer interaction e, and actively monitoring screen time. Our findings suggest further professional development for teachers on integrating affordances of technology into online pedagogy and more parent-teacher collaboration is needed.

Introduction

The Covid-19 pandemic has brought unprecedented challenges to language and literacy learning this past year. Globally, we have witnessed a COVID-19 induced decline in language and literacy growth among many children, as early as in kindergarten (World Literacy Foundation, 2020). While all children are affected, students who are second language (L2) learners face additional challenges as online instruction and COVID-19 restrictions reduce social interaction and language input critical to their language and literacy development (Granados, 2020). How to ensure their children's continued language and literacy success has been one of the top priorities among parents

and teachers during the pandemic. Based on two research projects conducted in Vancouver and Toronto, this article describes the challenges experienced by children learning an L2 in either French or English. We focus on children enrolled in French immersion (FI) programs and those who are English language learners (ELLs) in English-stream programs. Furthermore, the article shares the insights and coping strategies teachers and parents have gained in their joint efforts to promote their children's language and literacy learning.

In order to be successful in school and in society, children must become proficient in both social and academic language in the L2 (Friedberg et al. 2016; Uccelli et al. 2015). Social language, also referred to as Basic Interpersonal Communicative Skills (BICS), is the set of language skills that children learn to use for social purposes in daily interactions, such as casual conversations during recess or in the hallway with their friends or classmates (Cummins, 2008). On the other hand, academic language, known as Cognitive Academic Language Proficiency (CALP), refers to specialized vocabulary, transition words, and phrases that they need to learn specific subject areas such as social studies, science, and math. Academic language is often learned through textbooks, teachers' subject-area instruction and assessments, assignments (e.g., book reports, lab reports, and essays), class discussions, and other content-related materials (e.g., special topic documentaries) (Cummins, 2008). For learners of a new language, it may take 2-3 years to acquire social language in and out of school, but it can take between 5-7 years to acquire academic language.

Children need continuous support for both social and academic language learning in and out of school. As teachers and parents scrambled to adapt to online learning and "home-schooling" brought upon by the COVID-19 pandemic, there were many insights gained in how to manage these swift changes and keep children engaged in high-level language and literacy learning.

Challenges of Balancing Academic and Social Language During Pandemic

Input and interaction are fundamental to developing social language. Most parents of FI children do not speak French. Similarly, many parents of ELL children are also learning English themselves. As a result, FI and ELL children do not have much L2 input at home. They acquire the L2 through direct instruction from teachers as well as social interaction with teachers and peers. Unfortunately, the pandemic vastly reduces the amount of social interaction that is critical for language learning. In our interviews, parents reported that their children lacked opportunities to speak French or English with others due to the lockdowns imposed by the pandemic. Instead, children spent a significant amount of time in front of the television, on social media, or playing video games. Large amounts of screen time, as well as social isolation, are detrimental to children's language development (Canadian Pediatric Society, 2017). While screen time exposes students to some social language, there is no replacement for face-to-face interaction with a speaker.

At the same time, receiving school instruction online limits students' academic language input. Due to a lack of systematic training and technical support, teachers in different school districts are left to their own devices to experiment with different learning models. We learned that in the first few months of pandemic, while some teachers were able to offer a few hours of synchronous learning per week, others had to teach completely in the asynchronous mode. Social interaction was also impacted under the new COVID-19 protocols in face-to-face instruction. In many cases, it was impossible to implement the kind of pedagogy (e.g., group projects or pair work) that enables sustained academic language learning. Similar challenges have also been shared by teachers who

had to follow the new COVID-19 protocols in face-to-face classrooms. For example, students were forced to sit at their desks and work individually, with their faces covered. Social distancing restrictions prevented teachers from carrying out activities to build academic language, such as shared book reading and small group discussion. As well, they had to cut field trips (e.g., visiting a museum) or other experiential learning experiences (e.g., school community gardening or science experiments).

While teachers grapple with these technical and pedagogical challenges, parents are desperate for resources to help support their children as best as they can. Many parents told us that they had to help their children with homework assignments or explain academic concepts during the pandemic. It was a difficult task as parents were not proficient in the language their FI or ELL children were schooled in. Many parents lacked access to age and level-appropriate resources for developing both social and academic language skills in their children. They either relied on teachers to provide resources or identified resources through word of mouth in their social circles. Many parents had trouble discerning between a good resource and a bad one. On the other hand, teachers reported that they had to not only create curriculum materials but also make them available to students in multiple learning options (face-to-face; remote, or hybrids of both), though they often lacked the time or technical support to do so.

Encouraging Social and Academic Language in School and Home: Coping Strategies

What Worked for Teachers

Although teachers are faced with unparalleled challenges, COVID-19 safety protocols for small group learning and online learning have also enabled opportunities for both in-class instruction and after-school support. Given that COVID-19 has affected different learners' language and literacy learning in different ways, teachers emphasize the importance of making "academic language accessible" to all learners.

To achieve this, teachers have identified several strategies that work well under the new conditions. First, given that COVID-19 has exacerbated the disparities in children's language and literacy skills, differentiated instruction is needed to ensure the success of all learners. Instead of having the same assignments or learning tasks for all learners, teachers need to modify learning tasks as well as texts for struggling learners to better scaffold literacy learning. There are many ways to do this, ranging from shortening complex tasks (e.g., reducing the number of questions or number of paragraphs in texts), editing texts to simplify the language, adding visual aids, using Google Translate to provide dual language texts to support understanding, allowing students to use different ways to show their understanding (i.e., use of different digital media or different languages), or providing choices of texts (e.g., YouTube videos, audio books, or hardcopy books). Another recommendation was for classroom teachers to work more closely with ESL or resource teachers so they could pre-teach academic vocabulary and background information necessary for ELLs to participate in the classroom discussions.

Second, teachers emphasize the importance of integrating students' well-being into language and literacy learning during the pandemic. Teachers gave students the language and space to express themselves and talk about how they are feeling (e.g., about the pandemic, missing school, frustrations with technology, Zoom fatigue, etc). This can be incorporated into vocabulary instruction (e.g., words about emotions) for multilingual learners. Teachers also invited students

to share their home life and interests (i.e., their siblings, pets, the things they love doing with their family, the favorite food, the traditions they celebrate, or the stories they read) in storytelling sessions. These lessons can also be a great place for anti-bias education and for leveraging first language (L1) and background knowledge into academic learning in the L2.

Third, teachers share strategies to use technology to help develop social language, alongside academic language when teaching online. For example, online breakout rooms were set up for group work or reading buddies or playing fun games such as Kahoot quizzes. Some teachers also recommended turning students into teachers in terms of technology. Another strategy was to ask students for help. For example, a teacher may invite students to show her how to share screen on Zoom or figure it out together with her students. Many teachers continued to carry out inquiry-based learning online synchronously or asynchronously. For example, teachers helped students to identify a meaningful topic based on their interests (some teachers call it "a passion project"). They supported students with multiple online resources and encouraged students to showcase their learning outcomes in different ways.

Finally, teachers stress the importance of having regular communication with parents. They strive to keep parents updated about their children's progress at school so that parents can support their children more effectively at home. On the other hand, teachers need to understand what supports are available at home to create an individual learning plan for each child.

Some top tips teachers have used to strengthen the connection with parents include sending weekly summaries of learning home, sharing PowerPoints or notes, and keeping a learning blog for the class. Supplementary online learning resources are shared so that students can reinforce the concepts they have learned in the classroom after school. Since children are going through a lot of stress during this time, most of the teachers we talked to recommended reducing the amount of homework based on how students are coping and decreasing out of school tutoring. Teachers unanimously underscored the role extensive reading plays in expanding vocabulary and reinforcing academic language and recommend leveled, age-appropriate home reading especially for L2 learners who have experienced reduced exposure to the language during COVID-19 shut-down. With children spending more time at home, teachers also reminded parents to take advantage of the increased L1 exposure and expand daily conversations to more school-related academic topics.

What Worked for Parents

While some parents are still struggling, many have found useful strategies to improve their children's social and academic language skills. Parents emphasize the importance of maintaining a reading or writing routine. Many families created a reading routine by having their children read at the same time every day such as reading in the morning after breakfast, before using digital devices, or before bedtime. In many cases, families made full use of reading apps recommended by school teachers. Reading apps (such as Raz-Kids, Epic Books, Squiggle Park, and Dreamscape) keep children motivated in many ways. They level-up as students improve, track their progress visually, and compare their own reading level to that of their classmates. Some of these apps allow children to simply "tap" to learn word pronunciations or meanings, or to read along, which is especially helpful for L2. Other parents encouraged healthy reading habits by asking their children to read to younger siblings, providing books based on their children's interests, and allowing them to choose between digital and paper copies.

Many parents also incorporated a writing routine at home to cultivate a writing habit. Some parents encouraged daily journaling to enhance creative writing and create a daily writing habit. When some immigrant parents did not have the English proficiency to correct their children's writing, their children turned to online tools (e.g., Siri/Google) for help. Some parents asked their children to copy selected sentences from a book every day to enhance spelling skills. In other cases, parents followed the writing guides from commercial workbooks such as Canadian Curriculum to encourage writing. Others supported their children's writing by asking probing questions and providing content ideas.

Parents have found creative ways to encourage their children to use the L2 during the lockdown. Some ELL parents set up video calls so that their children could communicate with relatives or peers in English. One new immigrant parent had her children translate for her when they ordered food from restaurants and went shopping. Another mother found English cartoons helpful for her child and asked him to recite phrases heard on the shows to make up the lost English learning opportunities during the lockdown. Some families arranged outdoor activities for their children to connect with peers and practice speaking in a safe space. Connecting with peers socially can have many benefits. One family reported that peer influence highly motivated their daughter to read and she finished more than 300 books in the few months during the lockdown in 2020.

Parents, however, did notice a dramatic increase in children's screen time during the lockdown, both for online learning and time spent on social media, watching YouTube videos and TV, and playing video games. Therefore, the advice is to actively monitor the amount of screen time through the Screen Time App on their children's devices. Parents can also prioritize the use of apps that are approved by teachers as learning tools and work with their children to lay out a plan for screen time to balance between education and entertainment. Many parents also advised the use of parent dashboards available in well-designed EdTech applications to monitor their children's progress. For example, parents can use built-in Assignment and Progress Reports in Squiggle Park and Dreamscape literacy learning games to track their children's progress.

Conclusions

In sum, the COVID-19 pandemic has brought unprecedented challenges for children who are L2 learners. Under these circumstances, it is important to support both teachers and parents and strengthen the communication between them. Teachers need more support and training in technology to improve online delivery and to adapt and create meaningful learning activities. Parents need more guidance and resources to help their children at home. Teachers' coping strategies shared here validate many best teaching practices such as differentiated instruction to address diversity and interest, attention to student well-being, innovative use of technology, and effective communication with families. Similarly, successful methods reported by parents in our studies highlight the importance of maintaining reading and writing routines, facilitating peer interactions outside school, and managing technology use and screen time. As such, we have every reason to believe that the lessons learned during the pandemic will continue to facilitate language development of L2 learners when it is over.

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Theme 3: Challenges to Language and Literacy Brought on by COVID-19

The COVID-19 pandemic has led to widespread changes and profound disruptions in all aspects of our lives. Families and young children have experienced unprecedented changes to their daily routines. For many, the consequences of these changes are further compounded by job losses, financial insecurity, and social disconnection. The articles collated in this theme address how these transformations have affected the well being of children, their families and their language and literacy development.

The closure of schools and childcare facilities has made us more acutely aware of the importance of child care. Low- and middle-income families struggle the most to provide child care for their children while balancing the demands of their own work and their children's needs—both inside and beyond school ***(Article 3.1)***. It is crucial for policymakers to advance policies that support universal access to childcare in Canada. Access to childcare has been shown to support the wellbeing of parents and children, and to significantly improve children's cognitive functioning as well their language and literacy development.

A second consequence of the pandemic is our increasing reliance on digital tools in all aspects of our lives. We use technology to educate, communicate, and relax in the face of strict social distancing guidelines. Increasingly, we even use technology to conduct research ***(Article 3.2)***. Before the pandemic, there was growing concern that the mental and physical health of young children was being affected by the increased use of digital tools, a trend that has only been exacerbated by the pandemic ***(Article 3.3)***. Rather than following hard-and-fast rules about limiting the use of digital technology, parents are encouraged to develop a family plan that reflects their values and incorporates a balanced mix of activities each day. There is some evidence to suggest that technology can be used effectively during the pandemic to support children's early word learning and social development **(*Article 3.4)***. Thus, parents and educators need to be aware of the positive ways that technology can be used to support positive outcomes in young children. Despite these benefits, learning to read is an area in which children seem to be struggling as a direct result of less in-person instruction **(*Article 3.5*)**. While technology platforms can be effective in providing the basic building blocks of reading, they still fall short in identifying the errors children make and the current technologies are not yet sufficiently developed for scaffolding learning with respect to these errors.

Finally, one of the most obvious changes resulting from the pandemic is our everyday use of masks. Many questions remain about the effect of mask-wearing on in-person social interaction and its effects on the visual and auditory information transmitted when acquiring language and literacy **(*Article 3.6*)**.

In this theme...

Article 3.1. COVID Reminded Us That Childcare is Essential: Let's Make it Universal Too, by Yvonne Hii and Henny Yeung

1. Universal childcare is smart public policy, and it helps young working parents return to the workforce.
2. Universal childcare also reduces inequities in school-readiness by improving cognitive and linguistic skills in children from disadvantaged backgrounds.
3. Universal childcare is not one-size-fits-all: Governments can and should fund community-based programs that are adapted to specific cultural traditions around childcare.

Article 3.2. The Upside of Online: Psychology Studies During the Pandemic, by Alona Fyshe and Janet F. Werker

1. We encourage the inclusion of more diverse samples in language research.
2. Larger, more inclusive samples help reveal similarities and differences in language and literacy challenges in people from different backgrounds.
3. Overcoming obstacles to research, such as those encountered during the pandemic, can open new learning opportunities.

Article 3.3. Children's Well Being As We Emerge From the Pandemic, by Susan Rvachew

1. In collaboration with their children, parents should identify reasonable limits on screen time, develop a family plan that reflects their values and introduce a balanced mix of important activities each day. This plan can include moderate amounts of digital participation that involve socializing, creating, and learning.
2. Educators, in collaboration with families, should ensure that all children have equal opportunities to acquire digital literacy skills so that they can use digital tools safely and productively.
3. Governments, in collaboration with industry and community partners, should support the development of high quality applications and protect children from exposure to unhealthy apps and excessive advertising.

Article 3.4. Beneficial Ways to Use Child Screen Time During the Pandemic and Beyond, by Haykaz Mangardich, Janet F. Werker, and Susan Rvachew

1. Screens can never be a substitute for face-to-face interaction. However, there are now some high-quality apps that permit back-and-forth social interaction that can facilitate language and literacy acquisition.
2. Parents should encourage their children to use screens with social partners who respond with direct feedback in real-time interactions. Such interactions have been shown to support children's social skills and help them learn new vocabulary.

Article 3.5. Technology and a Child's Journey to Literacy, by Jenny Thomson and Hélène Deacon

1. Current digital technologies can support young children learning to read, but do not replace instruction from an educator. High quality apps can provide motivating and immersive reinforcement of skills like word recognition that need many hours of practice to become automatic.
2. Reading for understanding is more difficult to teach online, and dynamic digital environments can challenge the reading comprehension ability of children and adults. Parents and teachers can play an active role in helping children understand what they read on screens, encouraging children to summarize chunks of text as they read or predict what might happen next. Simple questions such as "what just happened?" or "what do you think might happen next?" can activate deeper levels of understanding in children.

Article 3.6. Face-Mask and Language Development: Reasons to Worry? by Henny Yeung, Suzanne Curtin, and Janet F. Werker

1. It is important to encourage parents and other home caregivers to engage in face-to-face interactions with their infants and young toddlers as this kind of rich conversational interaction is essential for healthy language development.
2. When face masks are required in school or day-care settings for public health reasons, it is important to monitor language and literacy development, particularly in children who might have a language other than the language of instruction as their primary language.

Article 3.1. COVID Reminded Us That Childcare is Essential: Let's Make it Universal Too

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The chaos of the first COVID lockdown served as a stark reminder of why we need childcare. Many of us, even those without children at home, had our workdays turned upside down when schools and childcare facilities were shut across the country. The often-invisible work of childcare became glaringly visible, literally so for caregivers making video calls from improvised home offices, and more crucially so for those who had to decide between going to work or watching a child. As schools and childcare facilities across the country have reopened in starts and stops, COVID has continued to lay bare the many systemic inequalities of our current childcare policies.

For one, there is a critical shortage of licensed childcare spaces. In 2019, available spaces would have accommodated just over a quarter of Canadian children under 5 years of age (Friendly et al. 2020). Many rural and urban areas of the country are known as 'childcare deserts,' where available options are too few for parents to even consider licensed care (MacDonald 2018). Yet, even in a world where more licensed spaces were found, childcare would still be expensive under the current system: Outside Quebec, a typical family in one of Canada's population centres paid over $10,000 for childcare in 2019 (Macdonald & Friendly 2020). These high costs and the low availability of childcare are strong deterrents for parents going back to work, particularly so for low- and middle-income mothers, whose participation in the labour market (Statistics Canada 2021) and mental well-being (Aknin et al. 2021; Pierre et al. 2020) has disproportionately suffered from COVID. These trends exacerbate pre-existing gender inequities in employment and income, which were already greatest in places with the highest childcare fees, like Toronto and Vancouver (OECD 2018).

As we consider the many ways that our society will change after COVID, calls for universal access to childcare in the Canadian social safety net are increasing in number and in volume (Gillck 2021; Mo 2021; Powell & Ferns 2021). There are clear economic and pedagogical benefits for universal childcare, particularly for low- and middle-income families, who are emerging from the pandemic facing significant challenges.

First, lowering the barrier to find childcare promotes labour force participation for all caregivers, particularly for those aforementioned low- and middle-income women (OECD 2018). Second, Canadian employers stand to benefit, as those who support childcare have seen more successful recruitment, retention of talent, and reduced absenteeism (Milkovich & Gomez 1976; Youngblood & Chambers-Cook 1986). Improved productivity (Gullekson et al. 2014), greater employee job satisfaction, and faster return to work for new mothers (Nowak et al. 2013) have also been observed. Finally, decisive government policies for universal childcare show a consistently high return on investment from these economic benefits: Although costly in the short-term, studies indicate returns on investment ranging from $2-7 on every $1 spent (Stanford 2020; Alexander et al. 2017).

Universal access to childcare is not just good policy for adults: It would also benefit the infants and children being cared for. While parenting is by far the most important predictor of healthy child development, there are still real and long-lasting benefits attributable to childcare access. These benefits—particularly for cognitive skills, like language and literacy—are greatest for the children from disadvantaged families (NICHD Early Child Care Research Network 2006; van Huizen & Plantenga 2018) and strongest when childcare is universally available, rather than targeted to low-income families (Cascio 2021). Researchers are still working out the mechanisms driving this linguistic boost from childcare (Larson, Barrett, & McConnell 2020; Weigel, Lowman, & Martin 2007; Soderstrom et al. 2018), but gaining access to high-quality childcare does seem to change how parents from low-resource families interact with their own children (NICHD Early Child Care Research Network 1999; Owen, Ware & Barfoot 2000), perhaps by increasing awareness about their child's development. These newly informed parents then go on to have richer and more conversational exchanges with their infants and young children (Cartmill, 2016; Rowe, 2008; Suskind et al. 2016), which are the best ways to build those early language skills (Hart & Risley 2003; Hoff 2003; Huttenlocher et al. 2010; Weisleder & Fernald 2013) that will later support literacy and reading at school age (Clarke et al. 2010; National Reading Panel, 2000).

What would universal childcare look like in Canada? One idea is to extend the mandate of public education to children 1-4 years of age for families who want it, and to offer before- and after-school care that matches the hours of a standard workday, as is now done to varying degrees in many regions of Canada. This may involve co-locating childcare facilities with schools in order to centralize access, which will boost participation in early care and learning programs in Canada, currently well below OECD averages (McCuaig & Akbari 2017). Expanding public education to cover the age ranges currently served by licenced childcare providers might also help create oversight into the quality of care, which is also an important ingredient in fostering a developmental boost for children in childcare (Araujo et al. 2019; Burchinal et al. 1996; NICHD Early Child Care Network 2002; NICHD Early Child Care Network & Duncan 2003).

This vision of universal access to childcare also has to be reconciled with the traditional practices of our many diverse communities. For example, it is members from within the community who traditionally care for the youngest ones in many Indigenous communities, providing access to culturally specific languages and customs. Incorporating this cultural component into a universal system will require both nationwide approaches, such as developing culturally-responsive teaching curricula for all Canadian early childhood educators, as well as more community-specific approaches, such as providing public funds and support to Indigenous-led efforts that embrace these childcare traditions (Inuit Tapiriit Kanatami 2014; Friendly et al. 2020; Seeber 2020). A similar reliance on family and cultural traditions in early care is also prevalent among several immigrant groups, who may benefit from similar inclusionary programming to ensure that childcare needs in these communities are also being met.

COVID has, in so many ways, shown why we need a stronger social safety net in Canada. And as we consider changes that may be made to this safety net, there are many reasons to consider a role for universal childcare. Although expensive, it is a win-win-win, as research suggests long-term, but clear benefits for those young parents facing the greatest barriers in our labour market, for their children, and for our national economy.

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Article 3.2. The Upside of Online: Psychology Studies During the Pandemic

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The pandemic has changed so many things. We haven't seen a cashier's full face for months, the smell of hand sanitizer lingers in the hallways of schools, and this holiday season was certainly one to remember—or, perhaps, to forget. For psychologists, the pandemic has meant that in-person data collection is, at least for the time being, no more. This means no brain imaging, no high-accuracy eye tracking (a correlate of decision making), no motion capture.

This change has forced psychologists like us to think more creatively, and to return to basics. What is it that we truly wish to measure? Is brain imaging or eye tracking really the *only* way to get our answers? Forced back to the drawing board, we have been thinking more deeply about our core research questions.

Biz Stone, co-founder of Twitter, is quoted as saying "Creativity comes from constraint." Artists have a long-standing tradition of self-imposed constraints, leading to inspiring works of art. For example, Canadian poet Christian Bök wrote a book with five chapters, each using only a single vowel, revealing the richness of language and how creativity can blossom under constraints. And many of us have felt a rush of productivity in the face of a looming deadline. So perhaps the constraints of a pandemic can push us towards better science, and a deeper understanding of the human mind.

As an example, we had designed an experiment to study the development and refinement of word meaning from infants through to children of reading age. We had originally planned to measure the similarity in brain activity when infants heard, or older children read specific words, and how those patterns of similarity change during development. Without in-person data collection, we had to remind ourselves of the deeper questions behind our research: how does word meaning change over time, as children acquire language and learn about the world around them? How can we measure a person's perception of word meaning without explicitly asking them? Inspired by previous research, we are now launching an on-line study that will allow us to answer these questions by asking children to group images in whatever way they deem suitable. With infants, who cannot point or give verbal responses, we can record through the on-line interface which objects they look at longer (now possible with lower accuracy eye tracking in webcams). We hope to show that as children learn language the importance of different aspects of meaning changes, causing them to group objects differently.

Online studies also allow us to collect samples from a larger and more diverse population. Sadly, typical university-based psychology studies often use an unrepresentative sample of people drawn mostly from undergraduate students. Sometimes this is because students enrolled in a psychology course can obtain extra credit by participating in a study, and sometimes it's because undergraduates are the ones who see our recruitment posters around campus. Either way, these factors make for a sample that is disproportionately white and largely middle- to upper-class (and of course having at least some undergraduate education). And, if there's anything that

psychologists have learned, it's that socioeconomic and cultural factors can have a large impact on study outcomes.

One famous study asked children to not eat a marshmallow in order to receive two marshmallows later (Mischel, Shoda & Rodriguez 1989). Children who were able to delay gratification were shown to have better markers for success (such as standardized test scores) (Shoda, Mischel & Peake 1990). Redoing this study years later with a much broader sample of children, showed that the relationship held only for some groups of children. Maternal education and other aspects of the home environment also impacted the correlation (Watts, Duncan & Quan 2018). So what was touted as a test of some inherent ability to delay gratification could be greatly affected by the backgrounds of the children who participated in the study.

Even for studies that recruit participants from off campus, perhaps because they are studying people outside of the typical undergraduate age range, socioeconomic status can still impact our samples. In the past, we often required people to come to campus to participate in an experiment. Who has the flexibility to bring their kids to campus for a study? Often these are households where only one parent works, or people in neighbourhoods closer to campus. Again, this selects for certain groups, which can skew a sample.

Some studies can be done by having participants visit a website, which means we can recruit people from different geographic areas including outside of major cities. And if people can just visit a website to participate, they can join the study at whatever time best suits them without having to book an appointment. This also lowers the barrier to entry for busy families.

Of course, online studies have to be accessed via computer, often a limited resource in poorer households (especially now that multiple children may be attending school virtually). The barriers to participation have not been removed, but they certainly have been lowered.

In sum, challenge can bring creativity. The pandemic turned what had been a tentative beginning to on-line research into a torrent—broadening the impact and scope, sharpening the research questions, and including a more diverse population. We will not drop these kinds of studies when the pandemic is over. They will supplement and complement the regular university-based research, which together will yield better data, and thus help us to understand people better.

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Article 3.3. Children's Well Being As We Emerge From the Pandemic

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Concern about Canadian children has been increasing for some time now. There is evidence that academic achievement is falling (OECD, 2019), obesity is rising (ParticipACTION, 2020), and mental health needs are being unmet (Comeau et al. 2019). It has been tempting to attribute changes in children's well being to the doubling in screen-time use that has occurred over the past decade (UNICEF Innocenti, 2020). Now, during the pandemic, screen time exposure has doubled again in less than a year (McGinn 2020). Concern about children's physical and mental health and their academic progress continues to rise but is muted by the focus on preventing the spread of the virus. We can expect that a strong emphasis on child health and well being will return, stronger than ever, when the pandemic recedes toward the end of the year.

What is the role of digital technology in our planning for children's well being, now and in the future? Do we wean children off screen time now, planning for a screen-free post-pandemic future? Or will digital tools continue to be fully embedded in our daily lives as they are now? The path we follow will depend upon our values and on a clear reading of the scientific evidence. What is the relationship between screen time and child health?

It is common to hear that excessive screen time will harm children's physical or mental health (Johnson, 2018). These claims are based on surveys that correlate estimates of daily screen time with questionnaire responses (Madigan et al. 2019; Oberle et al. 2020; Robinson et al. 2017). As an example, young people might report whether they agree with the statement "I feel unhappy a lot of the time." These studies find very small effects: children who spend more than two hours a day on recreational screen time activities are likely to be more unhappy or worried or dissatisfied with life than those children who spend less time with their devices. They might also read less well and be heavier than children who have lower screen time participation. The effects are very small however and other aspects of the children's lives have much bigger impacts on well being (Kardefelt-Winther 2017). These studies are not designed to determine whether screen time causes poor outcomes for children.

Parents are often advised to limit their child's screen exposure as a solution to problems such as obesity or anxiety (American Academy of Pediatrics 2016). It is often assumed without evidence that screen time is harmful because it displaces healthier activities (Przybylski & Weinstein 2017). Research shows that removing digital devices does not typically have the desired outcome. For example, children who do not exercise will not move more when their devices are taken away unless other interventions are in place (Robinson et al. 2017). However, the specific ways that children use their devices may be a factor (Sanders et al. 2019). One child might be couch surfing and eating while watching videos while another is learning new yoga poses. One child might be bullying her friends on social media while another is receiving valuable social support. One child might be scrolling mindlessly through frightening headlines while another is creating a popular blog. Overall, the research suggests that moderate amounts of digital participation that involve socializing, creating, and learning can benefit children and young people.

Nonetheless, we are concerned about the mental health of children during the pandemic and into the future (Holmes et al. 2020). Young people are experiencing distress during this significant crisis in our society. Children and young people are suffering from social isolation, thwarted goals, and fear for their own health or the health of their family members. Some children who cannot go to school have no respite from crowding or violence in their own homes.

Parents who are worried about their children's mental health may be grasping for solutions. Limiting screen time may seem like a tangible strategy especially if their child is substituting video games for school or sleep. The difficulty lies in assuming that screen time limits will solve the problem.

Parents need to consider their children's health and well being in a holistic fashion. Promoting a healthy lifestyle and family cohesion are more powerful than limiting screen time. A healthy family routine and supportive family relationships are much more important to children's well being than any amount or type of digital media exposure. In fact, digital devices can be used to connect children to their parents, other family members, and friends in the community to ensure a strong supportive network to keep children grounded in uncertain times (Ponti & Digital Health Task Force 2019).

The pandemic has amplified social inequity and the broad lack of community support for families in Canada (Canadian Human Rights Commission 2021; Glass, 2020). All levels of government must be focused on reducing inequality and ensuring broader access to child-care, tutoring services, high-speed internet, income supports, and mental health services. Parents in collaboration with their children should identify reasonable screen time limits, developing a family plan that reflects their values and a balanced mix of important activities each day. However, it is not helpful to suggest that screen time limits will address significant concerns about children's development and well being. There is no substitute for carefully integrated policies and programs that connect and support children, their families, and their communities.

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Article 3.4. Beneficial Ways to Use Child Screen Time During the Pandemic and Beyond

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There is an ongoing and spirited debate about the benefits and drawbacks of child screen use. In 2017, the Canadian Paediatric Society recommended no screen time for children under 2 years of age, and less than 1 hour per day for children aged 2- to 5-years (Canadian Pediatric Society 2017). Citing the negative impacts of excessive television, medical professionals were concerned about children's weight, sleep, and school readiness. This debate is even more relevant today during the ongoing COVID-19 pandemic, as caregivers worry how much screen time is allowable for young children while staying at home. Children are using more types of screens, for more purposes, and for longer durations than ever before (Cheng & Wilkinson 2020). With the rise in screen time, it is reasonable for parents to wonder how much is "OK".

Here, we describe how screens can be used to support children's language and social development during the pandemic and beyond. We presage this with the notion that there are very distinct types of screen time—those that involve passive watching for entertainment, those that introduce or engage the infant/child with educational content, and those that are more interactive with another (online) person who is often a family member. It is that last type of screen time we focus on here. Of course, screens should not be taken as a substitute for face-to-face interaction with caring adults. But communicating through screens has been essential during the pandemic to keep families in touch even with little ones. Even post-pandemic, screen time is likely here to stay. So, we need to focus on ensuring quality screen time use. While the research is still ongoing, the evidence shows that children can learn from others through screens, particularly when on-screen communicators respond with direct feedback in real-time interaction.

Opportunities for Screen-Based Learning

Young children learn best when a caring adult responds to the child. It is the turn taking in back-and-forth communication, and joint attention to objects or events, that best enables a child to learn new words (Hirsh-Pasek et al. 2015). Adults who respond to what children say and do help those children achieve faster language development, and retain the words they have learned, over the long term.

There are other helpful ways adults can respond to children through screens as well. Video chats can allow parents to connect their toddlers with caring adults living remotely during the pandemic. With the help of a parent and the click of a button on a smartphone, children can have real-time, virtual conversations with loved ones. These conversations allow children to develop important social relationships and to practice many social skills that are used in in-person interactions.

For example, they see the communicator's facial expressions and body language, establish eye contact, hear the tone of their spoken words, ask questions, and have back-and-forth exchanges. Video chats are not a replacement for in-person contact, but they still provide opportunities for social learning.

It is now well documented that toddlers can and do engage in rich, interpersonal exchanges during video chats. For example, young children can share attention between their parents sitting beside them and the grandparent on-screen (McClure et al. 2018). Toddlers can also direct attention to objects and talk about them during virtual conversation. The toddler might show grandpa their favourite toy and talk about it. Even more impressive, the toddler might point to grandma's dog on the other side of the screen and start a conversation about this new point of interest. Evidence that toddlers seek opportunities to share attention in video chats reveals that they understand they are connecting in real-time with loved ones, even though the other person is not physically present. Video chat may therefore provide a unique opportunity for children to practice early attention sharing abilities and hone their burgeoning communication skills.

Another way that young children learn language is by connecting words and actions. An adult might describe what the baby is doing (e.g., "you are waving your hand" while imitating the baby). A preschool teacher might ask children to perform certain actions ("Touch your toes. Now wiggle your elbows"). Learning about actions is possible through video chat technology as well. If the communication partner establishes eye-contact, greets the child by name, asks questions (e.g., "can you point to your eyes?"), and responds with direct feedback in real-time (e.g., "great job! You pointed to your eyes"), the child can learn to follow directions. Some applications are now available to help adults and children play together on-line with game cards and drawing tools. These apps provide opportunities for making plans, sharing attention, and coordinating actions through conversation.

During childhood, the most powerful context for learning language is shared storybook reading. Parents and children like to do this close, snuggled up together. Sometimes this is not possible and video chat technology enables shared reading at a distance. The child might miss the cuddle, but children can learn as much from hearing an e-book read over video chat as they do in a live interaction (Gaudreau et al. 2020). Again, the crucial factor is immediate, "back-and-forth" responses to the young child during the reading exchange (Roseberry et al. 2014). Just like in a live reading interaction, it is necessary to have a routine that gives the child opportunities to get involved (Revelle et al. 2019). Read the words on the page, pause for the child to talk about the story or the pictures, and respond to the child before moving on.

Back-and-forth social interaction is crucial for children's language learning and social learning. We encourage parents to think about different ways this can be incorporated into children's screen time.

Conclusion

As the pandemic continues, we find new and better ways to use technology to communicate. Now more than ever we need to understand how technology and screens can be used to support children's development. Just like their parents, children must use screens–for working, for learning, for playing, for socializing. While distinct from in-person contact, and not a replacement for meaningful, in-person interaction, screen time can be used effectively to foster opportunities for language learning and social development. Toddlers need a mix of activities across the day,

including free play, story/book time, art activities, and active play. If parents do allow screen time, they are encouraged to incorporate high quality interactions with others as this has been shown to be crucial for children's language learning.

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Article 3.5. Technology and a Child's Journey to Literacy

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For all of us, the pandemic and various phases of lockdown have resulted in a lot more time looking at screens, whether this is when we chat with friends and family, or as we work from a distance and try to occupy the hours in which we are homebound. For our children, this is no less true, with an era-defining shift in how education is delivered. The model wherein a child is dropped off at a building that is a dedicated learning space, for face-to-face contact with a learning specialist, has been disrupted. Learning is happening at kitchen tables, in bedrooms and in the midst of parents' work lives, social networks and competing possibilities of engagement.

What are the key issues in literacy as we continue the online adventure? Here are three key considerations for reading—the single most important skill that children learn in elementary school.

A first is that issues of educational access are exacerbating inequities that pre-date the arrival of the pandemic. Reports are already suggesting that since March 2020, some children have fallen behind significantly. Findings coming out of Edmonton, Alberta, looking at trends in grade-level reading performance of children in September 2020, found that children in the earlier grades (1-3) have been particularly hit, compared to grades 4 and above (Folio 2020). Within the early grades, children who were already struggling readers were the worst affected. Within the US (Kuhfield et al. 2020) and the UK (Rose et al. 2021), racial and economic achievement gaps have also been seen to widen.

It is likely that this loss in learning is in part because of *a loss of instructional time*. At the height of the first wave of the pandemic, more than 90% of the world's children were out of school (UNESCO 2020). Being out of school meant that many children were not accessing the explicit instruction they needed, at least not to the same extent as in pre-pandemic times. Learning to read, especially in the early grades, requires explicit instruction, in learning both letter-sound correspondences, as well as the many other idiosyncratic spelling patterns of English; think 'igh', as in "light", or multiple ways in which a certain vowel sound may be spelt e.g. seen, heal, me, eve. It also requires many, many hours of repeated exposure and practice, both to become automatic in recognising single words, but also in taking the meaning of connected strings of words in order to acquire new knowledge, or become immersed in fictional worlds.

This leads us to the second consideration, that of how digital environments can best help this great feat of learning to read. The pandemic has thrown a particular spotlight on this particular question, as children have had less physical access to their classroom teachers; both schools and caregivers have had to rapidly evaluate if and how technology can compensate. Replacing a human teacher is a tall order. In teaching reading, just one of the roles of an educator, a teacher holds knowledge of the learning sequence, an awareness of how quickly or slowly to move through this sequence for different learners, and an ability to analyse an error or non-response from a child and adaptively respond, pedagogically and emotionally.

Technology platforms can certainly be programmed with the ability to present basic learning sequences. This can work very well for the basic building blocks of reading and learning the links between sounds and letters—"phonic" reading instruction. Learning letter-sound links and then blending these pairings together to form words is a skill that needs lots of practice to become automatised—while our brains have evolved for spoken language, written language is essentially a more recent "bolt-on", with the required neural connections becoming fine-tuned via practice (Maurer et al. 2006). And indeed, the automated, consistent mode of presentation that technology can offer is well-suited to this. Many phonics apps are currently available as a result and some of these apps are adaptive, in that they track e.g. percentage accuracy of responses, and if a child's scores go below a certain level, the difficulty level is reduced, or equally, if accuracy is good, more complex content can be introduced. This type of adaptiveness helps maintain an optimal balance of challenge, and forward momentum. Technology is also capable of providing timely positive reinforcement of success, and non-judgemental observance of error (e.g. Neumann 2020).

Where technology currently struggles more is in analysing the source of a child's misunderstanding if an error occurs—is there a spelling rule that is being misapplied? Was that a rule just taught this morning, and if so, was the rule understood? If not, why might that be? Did the child just temporarily mishear something, or is there a more persistent learning issue? Right now, it is difficult for technology to replicate an expert teacher's diagnostics in this way, though through the application of machine learning approaches, this limitation may not be insurmountable.

Equally, reading is more than single word recognition. Once words can be read with increasing automaticity, their meanings can be shaped into statements, paragraphs, narratives and treatises. To understand text beyond the level of single words, a reader requires knowledge of word meaning, complex sentence grammar, text genres, world knowledge and awareness of other minds (Kintch & Rawson 2005). A classroom of young readers could all come to the same text with widely varying levels of confidence and or experience in these different types of knowledge; evaluating this in real time and providing the appropriate scaffolds for each individual is a sign of masterful teaching, and still a next-step goal for digital technologies.

A third consideration in the use of digital technology as a format for reading and learning, is that for all of us, the very act of reading on a screen, as opposed to paper, may alter our ability to comprehend the written information we see. One key meta-analysis looking at reading comprehension on screens versus paper, across age-groups and experience with digital text, has suggested that in certain contexts, e.g. when reading informational texts, and especially in timed or exam conditions, reading comprehension is inferior when screen-based—the so-called "screen inferiority" effect (Delgado et al. 2018). This effect is not decreasing over time, as we become more used to digital reading, but rather the reverse. Of additional concern, Rakefet Ackerman and colleagues have consistently shown that our ability to judge our level of understanding reduces in digital contexts and compared to when reading on paper, there is a tendency to overestimate our level of comprehension (Ackerman & Goldsmith 2011).

Whilst these facts are sobering, it is important to note that in studies of paper and screen comparison, we expect the process of making meaning to look the same across modalities, and so we judge comprehension of digital information using metrics designed for comprehension of linear blocks of text, that follow on sequential pages. Equally, reading digital text is a relatively new skill for adults and children and alike, and so it makes sense that we are still learning how best to process information that can be presented in amazing webs of hyperlinks and multimedia. Digital

text allows us unparalleled opportunities for customising text appearance, layout and indeed any number of 'bells and whistles'. It has infinite capabilities for creating customised learning opportunities to support children to learn to understand what they read. The key is to make sure that these features actually support this learning; hotspots or animations placed in text purely for entertainment can distract a child from the main content flow, leading them away from (rather than towards) building understanding (Takacs, Swart & Bus 2015). Some tech designed to teach reading comprehension, such as Dreamscape by Eyeread, have addressed this by wrapping games around reading instruction; this has an advantage of keeping the motivational features of tech and embedding targeted teaching. Parents can also help activate deeper levels of understanding by encouraging their children to summarise chunks of text as they read or predict what might happen next.

In short, the dramatic shift to digital learning induced by COVID has brought into focus the opportunities and limits of tech as a teacher. We are at a point in technology development, where we cannot expect technology to take over entirely to teach children to understand what they read. It can go far in getting children solidly to become 'decoders', sounding out words effectively as a core skill of reading. On the whole, tech has a ways to go in getting children to the ultimate outcome of reading: understanding what they can read so that it can support their learning in school and beyond.

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Article 3.6. Face-Mask and Language Development: Reasons to Worry?

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Facemasks are an essential public health tool against COVID-19[1], and—until we know more about both vaccine distribution and efficacy over time—masks are here to stay. Although essential for infant- and child-caregivers in hospitals, in schools, and in other public spaces, many have asked how degraded auditory speech (Bandaru et al. 2020) and the accompanying loss of visible facial cues from wearing masks could influence speech and language development. Indeed, the muffling of speech that occurs from wearing a mask (or two, in the case of double-masking), creates exactly the conditions where visible speech would be incredibly helpful—particularly if there is also background noise such as in a busy classroom or daycare (Król 2018; Lalonde & Werner 2021; Nelson et al. 2005; Vatikiotis-Bateson et al. 1998). Some researchers have advocated the use of clear masks, but little research has been done on whether—and what kinds of—clear masks help, with some research suggesting clear masks could distort visible speech (Corey, Jones & Singer 2020). Below, we review what we already know about young children's use of visible speech, and highlight the future work that is needed to understand the impact of mask-use on language learning and development.

From birth, infants are attracted to faces, and sensitive to the correspondence between the sound and sight of a talking face (Coulon, Hemimou & Steri 2013). By as early as 2 months of age, infants look longer at mouth movements that match heard vowel sounds (Kuhl & Meltzoff 1984; Patterson & Werker 1999). By 4-months, babies will even imitate these audio-visually matching faces more than mismatching faces, where the sound and face do not correspond (Kuhl & Meltzoff 1996). Infant looking to the mouth only increases over the next few months and years (Berdsaco-Muñoz, Nazzi & Yeung 2019; Hunnius & Geuze 2004; Lewkowicz & Hansen-Tift 2012; Morin-Lessard et al. 2019; Tenenbaum et al. 2013). And, as early as 6-8 months infants more rapidly learn speech sounds when they can see a talking face versus when the face is partially covered (Teinonen et al. 2008; TerSchure, Junge & Boersma 2016). By the time they are 1-year-old, babies can use visual speech to help recognize known words (Weatherhead & White 2017), and by 2-years, they use it to help learn new words (Havy et al. 2017; Weatherhead et al. 2021). Indeed, by 2.5 years of age, toddlers can even learn new words just by lip-reading if they first hear someone say that word (Havy & Zesiger 2020). Together, this work shows that babies and toddlers can and do use visible information in talking faces to assist their processing and learning of spoken language. Importantly, however, visual speech perception is still developing, as the ability to use visual speech continues to grow across childhood and into adolescence.

From 3-8 years of age, children can detect and distinguish individual sounds (like /ba/ versus /ga/) using visual speech as well as adults do (Lalonde & Holt 2015; Lalonde & Holt 2016), but show

1 https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/prevention-risks/about-non-medical-masks-face-coverings.html

much less of a visual influence than adults when recognizing words (Lalonde & Holt 2015; Lalonde & Holt 2016; Fort et al. 2012). And while children throughout the 4 to 14 year age range can use their immature visual speech abilities to aid perception when the auditory signal is obscured (Jerger et al. 2014) or when listening in noisy environments (Ross et al. 2011), their reliance on visual speech is much larger in older than younger children, and it is only in adulthood that visual cues significantly improve speech processing even in quiet environments (Desjardins & Werker 2004; Hockley & Polka 1994; Sekiyama & Burnham 2008). When there is no sound at all, children 5-6 years of age can begin to guess what word is being said from lip-reading alone (Knowland et al. 2016; Kyle et al. 2013), but this ability, again, does not reach adult levels of accuracy until at least 13-14 years of age (Ross et al. 2011; Kaganovich, Schumaker & Rowland 2016; Tye-Murray et al. 2014). Thus, even though children use visual speech information, it may not be as important for language comprehension as it is for adults.

How concerned should we be that the need for masks in public settings will impact child language development and school-based learning? While we need to be vigilant, there are perhaps several reasons to not be overly concerned. First, mask-wearing is not common at home, and so infants and children likely have considerable opportunity to hear language while watching talking faces. A critical research question is just how much access to this visual speech component is needed to provide sufficient exposure for language development. For now, we do think it is important to encourage face-to-face interactions in the home for parents and other home caregivers, which not only provides access to visible talking faces, but critically also supports the kind of rich conversational interactions that we know are essential for healthy language development (e.g., Wang et al. 2020).

Second, it is also not known whether access to visual speech outside the home is equally important for all learners and across all environments. For spoken language, for example, access to visual speech may be crucial in only some circumstances, like in noisy environments, or for some children, like those learning in a second language at a certain age. It may be most essential only in some tasks, such as when teachers are trying to teach children to map sounds onto letters. Finding the answers to these questions can help parents and educators figure out alternative strategies for these settings and/or for these learners.

Third, we need to better understand how much speech information is conveyed from the parts of the face that remain unobscured by masks. While the bulk of speech is certainly conveyed by the movements of the mouth and lower face, there is also information in eye movements, head nods, and the like, which contribute to language understanding (Munhall et al. 2004). The brains of infants and young children are more plastic than those of adults (Werker & Hensch, 2015). Thus, young children may be able to learn—more rapidly than adults—to use the information that is available even in masked faces to facilitate understanding of what is being said. While we wait for research addressing these questions, we can take comfort from recent studies that show children—even toddlers—can learn language in carefully selected interactive online book reading and video chat sessions (Gaudreau et al. 2020), providing another avenue of access, even in classrooms, to visual speech information.

The increased use of facemasks in public spaces is anticipated to last for a long time, perhaps for years if vaccinations are not efficiently and equitably distributed around the world (see Washington Post 2021). Yet, this is not a new phenomenon: Face coverings—whether for religious and cultural reasons, or as protection against disease or pollution—are common in public spaces within many

societies from other parts of the world (Chan 2020; Wagner et al. 2012), and children growing up in these societies are successful too in learning spoken language. So, until masks are no longer required, let us remember that the development of children's use of visual speech spans many years, and there is not currently any evidence that reduced exposure to faces has any dramatic impact on speech and language development. As we wait for evidence-based best practices about mask use and language development, we should all do our best to ensure that we talk to and interact with our infants and children at home, not simply because home is where we remove our masks, but rather because decades of research has shown that language development is optimal when infants have a rich language environment, hearing lots of speech with a variety of words and sentences in socially-guided conversational interactions. We can still build a rich linguistic foundation that will be critical as our infants and toddlers enter schools, and as our children move through their school years.

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Theme 4: Language Use During COVID-19

The COVID-19 pandemic has changed the way we use language—for one, it has introduced new expressions into our vocabulary: social distancing, flattening the curve, zoom bombing, among other new phrases.

The pandemic is a primary topic of conversation around the world, and a central topic for most digital and print media, giving rise to questions about how we communicate about the virus. In this section, we explore some of the pressing linguistic issues that have emerged during this pandemic.

Social media shows a clear shift in language use on account of the pandemic. As social distancing restrictions came into place, conversations increasingly moved to virtual spaces. At the onset of the pandemic, Twitter activity shifted from users merely posting tweets to users directly talking with one another ***(Article 4.1)***. Twitter users reached out to one another to offer sympathy, talk about their families, to reflect on life events and discuss the shift to increasingly digitally-mediated interactions.

Language has also been harnessed to further social division, with misinformation about the pandemic freely shared across the web. Hateful words have been used to describe aspects of the pandemic, reminding us that how we name diseases can reflect racist sentiments in our societies ***(Article 4.2)***. These issues highlight the need to be mindful about which words we use and how we use language more generally to communicate with one another.

Language also plays a central role in the uptake of information, and users consider authority, veracity and reliability when they engage with a media source. Many Canadians are still not receiving public health information in the language in which they are most comfortable ***(Article 4.3)***. Better data about actual language use across Canada will help to support targeted public health messaging in diverse Indigenous and immigrant communities.

These articles provide a snapshot of language issues during COVID-19, offering an important reminder that language is a key factor in our individual and social health and wellbeing.

In this theme...

Article 4.1. Negotiating the Pandemic Twitterverse, by Muhammad Abdul-Mageed

1. Without infringing on user privacy, it will be useful to employ automated methods based on artificial intelligence to analyze population mobility during crises.
2. In support of a more informed public health policy, artificial intelligence can be used to detect online misinformation and identify the geographical distribution of where it is spread.
3. There is a need to carry out automated analysis of non-English data on online social networks. This type of social media mining requires sufficient computing infrastructure with machines that can research deep learning.

Article 4.2. Why Disease Names Matter, by Heidi Tworek

1. Whenever possible, steer away from using geographic names to refer to variants or to COVID-19. It can be cumbersome to use numbers (e.g. B 1.1.7), but it is crucial to avoid stigmatization.

2. Officials should be careful in how they describe COVID-19 outbreaks, avoiding language that might stigmatize marginalized or racialized groups.

Article 4.3. The Unequal Effects of COVID-19 on Multilingual Immigrant Communities, by Sienna Craig, Maya Daurio, Daniel Kaufman, Ross Perlin and Mark Turin

1. Linguistic diversity in Canada, the U.S., and around the world is increasingly concentrated in urban areas. To better support marginalized language communities, city governments and health authorities should collaborate with linguists and communities to map urban linguistic diversity.
2. Public health messaging in communities' mother tongues is vitally important—not just one-off individual signs or posters, but flexible audiovisual communication channels featuring trusted community voices on an ongoing basis.
3. The COVID-19 pandemic has exposed how structural inequities—including unequal access to services and information due to language barriers—render some populations more vulnerable. In light of COVID-19, officials should rethink policies around language access, especially in life-and-death health care settings and under quarantine conditions.

Article 4.1. Negotiating the Pandemic Twitterverse

Muhammad Abdul-Mageed, Assistant Professor, School of Information, Department of Linguistics, The University of British Columbia

Society's increasing reliance on social networks since the start of pandemic raises important questions about the role of these networks in our pandemic lives. To investigate some of these questions, we studied publicly available messaging data on Twitter (Abdul-Mageed et al. 2020).

When we started this research, we had a number of questions: Has the pandemic changed any general patterns of communication online? What major functions is Twitter playing during the pandemic? Can the data be used to measure our restricted physical activity? How much false information is shared on the network?

To understand the impact across language and culture, we collected a diverse 10-year dataset from one and a half billion public Twitter messages posted by users from 286 countries in 100+ languages so that we can compare before and during COVID-19. The messages exchanged between users are themselves an important archive of life during the pandemic that can reveal new knowledge about human behavior, including how individuals and groups are coping around the globe. Thus, extracting opinions and summarizing trends from this public data, while respecting privacy, can help guide policy makers to better understand what the public needs and what the best ways are to serve different communities.

The pandemic sharply changed the usual flow of communication on Twitter. For example, during the first quarter of 2020 the most frequent activity was direct interactions between users rather than the typical posting of tweets. Compared with older data between 2007-2019, it is clear that the pattern of users engaging in conversations is associated with the pandemic. For the first time in the history of Twitter, users are more interested in directly talking to one another than in sending tweets.

We found that users not only reached out to others to offer sympathy, talk about family, and relate to life events but that conversations also included heated discussions about government policies, workplace accommodations, access to services, and other important topics.

We derived other insights from this data. For example, during the first three months of 2020, in Europe where some countries were being hit quite hard, pandemic related messages were more frequent while in Asia more conversations involved political discussions unrelated to the pandemic. Such information about what people in a particular region care about at a given point in time, and their identifiable level of awareness about the health crisis, could be used to allocate resources and carry out targeted information campaigns. Artificial intelligence (AI) can power technologies of this type of opinion mining, enhancing, or even replacing, traditional polling methods such as questionnaires and phone call surveys.

The data also allowed us to gain insight into human physical activity as many users chose to share their location publicly and/or talked about places they visited. We found that many people reduced their activity levels starting in March 2020 but globally the activity patterns followed the pandemic. For example, the decline in activity started in Italy earlier than in the U.S. and Canada indicating how social data match human activity on the ground. Since these patterns can be

acquired while events are happening, they can be used to help guide timely public health policy.

We also used the data to identify and quantify COVID misinformation on the network using a two-stage approach. We first taught computers to detect whether a tweet was about the pandemic or not, and any new incoming post related to COVID was examined by another AI model to determine whether the post is "true" or "false". True posts are simply those that do not contradict known facts, while false ones are those that carry rumors and fake stories about the pandemic. The model can spot false pieces of text such as "Corona virus can be cured by one bowl of freshly boiled garlic water…. doctor has proven its efficacy" and "Drinking alcohol is the best remedy for COVID". Using this detection approach, we quantified misinformation on the network using 30 million tweets randomly sampled from data not used to develop the model and found that about 2.5% of all English tweets posted in early 2020 carried misinformation about the pandemic. While this might seem small, we estimated that over 7 million tweets with COVID misinformation were shared *every single day* in the first half of 2020. Even if each tweet is seen by only 150 people on the network, this amounts to over one billion reads. The World Health Organization was correct to label this situation an infodemic due to the rapid spread of false information. It only takes a single false tweet acted upon by only a few people for someone, or many people, to be hurt. As a society, we need to proactively work to address the infodemic. But how?

The first thing we need to do is equip people with the critical thinking and research skills to identify, question, and evaluate what they see online.

We also need to encourage Canadians to actively refute misinformation when they witness it, civilly and without alienating others. For example, a message such as "Thank you for your post. I found this page from WHO that emphasizes garlic cannot cure COVID. Grateful to connect here!" is informative while being friendly. Individuals need to be able to locate evidence and make informed judgements as they navigate through their daily information journey.

Our research shows we can use technology to fight misinformation but there is considerably more work to be done, for in any multilingual society we need to develop tools for different languages to ensure any strategy developed is comprehensive and inclusive. Another bottleneck is that deep learning, a class of AI inspired by information processing in the brain that we use to develop these solutions, requires specialized hardware. The federal government, provincial governments, and universities should all increase investments in this type of infrastructure as this will enable scientists to carry out their research and accelerate development of solutions.

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Article 4.2. Why Disease Names Matter

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Anti-Asian racism is on the rise throughout North America. On March 16, 2021, a shooter killed eight victims in Atlanta, Georgia, most of whom were East Asian Americans. The shooting appears to have been motivated by a combination of sexism and racism. In Canada, Anti-Asian hate crime skyrocketed in Vancouver from 12 reported incidents in 2019 to 98 in 2020 (Jonas et al 2021), and the prevalence of anti-Asian racism is higher in Canada (Project 1907 et al 2020) than south of the border. Much of this rise on both sides of the border seems attributable to blaming Covid-19 on China and then extrapolating to stigmatize all East Asians.

Racism is rising despite our knowledge that "pandemics may arise anywhere," as historian Mark Harrison (2016) has put it. BSE arose in the United Kingdom, for example, but did not lead to stigmatization of British people. When former US president Donald Trump called Covid-19 "the Chinese virus" or "kung flu," he was only the latest to attribute pandemics to Asia.

What steps can Canadians take to combat this racism?

To start, it is necessary to recall that, sadly, the rise of anti-Asian racism over the course of this pandemic is only the latest manifestation of scapegoating "outsiders" that draws on a long-standing narrative during epidemics. Jews were blamed in Europe for spreading diseases like the Black Death, resulting in violent anti-Semitic attacks that destroyed over 200 Jewish communities from 1348 to 1351 (McNeil 2009). Muslims were blamed for a purportedly fatalistic tolerance of disease that enabled epidemics to spread (Mikhail 2020).

Disease-naming has long been politicized according to where someone lives. For example, depending on where you lived in Europe, syphilis was called a French, Neapolitan, German, Polish, or Spanish disease. The Ottomans called it the "Christian disease," while Muslims and Hindus in India blamed each other and Europeans (Tampa et al 2014).

By the nineteenth century, European imperialism had heightened some of the anxieties about the supposed origins of infectious disease and transposed those anxieties onto Africa and Asia. When cholera epidemics started to occur in Europe and the United States from the 1830s, the disease came to be known as "Asiatic cholera" because many believed that the disease's origins lay in India (Harrison 2020).

Of the four large flu pandemics since 1889, three received monikers implying that the disease originated in Asia, though more often East Asia: the Asiatic flu of 1889-90, the Asiatic flu of 1957-58, the Hong Kong flu of 1968-69. The Spanish flu of 1918-20 was the exception that proved the rule. The name does not appear to have provoked outbursts against Spaniards.

Research suggests that there are ways to preempt and combat stigmatization. The most obvious is to avoid the use of place-based monikers to describe disease. The World Health Organisation (WHO) has long advised against calling a disease after a location. In 2009, for instance, Dr. Mirta Roses, director of the Pan American Health Organization, advocated to ensure that H1N1 would

not be named after the country (Mexico), state (Veracruz), or town (La Gloria) where the disease was first identified (McNeil 2009).

A third lesson reminds us of the centrality of leadership (Tworek, Beacock & Ojo 2020). For example, when public officials in Taiwan learned that some boys in school were being bullied for wearing pink masks, the officials showed up at their press conference the next day in pink masks to push back against gender stereotypes. After a Covid-19 outbreak at a gay nightclub in Seoul, South Korean officials deliberately described this as an issue of "clubgoers" and enabled anonymized Covid-19 tests. This allowed people not to be outed by getting tested and avoided scapegoating the LGBTQ community.

Finally, it is up to all of us to promote the evidence, science and data demonstrating the fundamental falsity of racist claims. For example, Richmond, British Columbia, has continually experienced one of the lowest rates of Covid-19 in Canada. Richmond also has the highest proportion of residents identifying as Asian of any city in North America; more than half of its residents identify as Chinese. The Chinese community adopted measures such as mask-wearing and self-isolation early, which some infectious disease specialists believe (Yeung 2020) contributed to lower infection rates.

The naming of diseases can seem to be an abstract question, but attention to history and rising racism are evidence that words matter.

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Article 4.3. The Unequal Effects of COVID-19 on Multilingual Immigrant Communities

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In March 2020, New York City became the global epicenter of the COVID-19 pandemic (Tolentino et al. 2021, p. 1). By May, the city had reported more than 170,000 confirmed cases and over 18,000 confirmed deaths. While nearly every city resident was impacted, the effects were not evenly distributed. The same pattern of unequal impact and exposure has played out time and again in the United States, Canada and beyond. New research and public data point to serious disparities by ethnicity and race, and it is beyond doubt that marginalized and multilingual immigrant communities in hyper-diverse urban settings in Canada and the US have been among the hardest hit by COVID-19 (Piller, Zhang & Li 2020).

Our recently-released digital language map (Mapping Linguistic Diversity, n.d.b.) shows that New York City is home to at least 700 languages, making it the most linguistically diverse urban centre in the world. Canada's linguistic diversity is also concentrated in its urban areas, where 75.5% of people with an immigrant mother tongue live in one of the six largest census metropolitan areas (Statistics Canada 2017). Toronto is the most linguistically diverse city in Canada, home to approximately 200 of the 215 different languages spoken across the country, according to the 2016 census (Government of Canada 2019). Based on our experience mapping languages that go unreported in the US census, the actual numbers for Toronto, Vancouver and other Canadian cities are likely to be significantly higher. Revealingly, 45% of Toronto residents speak a mother tongue other than French or English. For good reason, the Endangered Language Alliance (ELA), a non-profit research organization dedicated to documenting linguistic diversity and supporting endangered languages, has two branches, in New York (Endangered Language Alliance, n.d.) and Toronto (Endangered Language Alliance Toronto, n.d.a.).

During the height of the pandemic in New York, we combined ELA's language data and COVID-19 testing data released by New York City's Department of Health and Mental Hygiene to create a map (Mapping Linguistic Diversity, n.d.a.) of positive COVID tests per ZIP Code per capita and the distribution of languages across the city. This visualization illustrated a connection between high numbers of COVID-19 cases and neighborhoods with significant linguistic diversity. How can we understand the relationship between areas of linguistic diversity and spaces of vulnerability?

The evidence suggests that fundamental inequalities around income, housing and health all play a role (Piller & Takahashi 2011), combined with the fact that many immigrants are frontline workers

in healthcare, food service and transportation (Tayaben & Younas 2020; Reid, Ronda-Perez & Schenker 2020). But an additional factor has received less attention: language. An analysis by Brigham and Women's Hospital in Boston of mortality rates among patients found that those who primarily spoke Spanish were 35% more likely to die from COVID-19 and that this presented as a greater risk factor than race or a preexisting condition like diabetes (Bebinger 2021). In a pandemic, when public health messaging is updated on a daily basis, politicians and public health officials need to communicate clearly and consistently with the populations they serve. Translating fast-changing directives and complex new terminology such as "social distancing" or "community transmission" into different languages is challenging at the best of times, and requires networks of trust and good relations with immigrant communities.

In moments of crisis, community networks become vitally important for timely and effective communication. If city officials know the approximate locations of different language communities—through community-based language mapping—they have the baseline data and necessary context to craft appropriate messaging. A translated sign or poster is better than nothing, but it is no replacement for flexible audiovisual communication channels featuring trusted community voices using community languages on an ongoing basis.

When the pandemic hit, people across the world stepped into the breach (McCulloch 2020), offering targeted translation and interpretation of key public health messages for language communities not served by the global language technology giants. For example, the virALLanguages (virALLanguages, n.d.) initiative, Translations for Our Nations (Translations four Our Nations, n.d.) and the Endangered Languages Project (Endangered Languages Project, n.d.) bring individuals and communities together with the goal of sharing reliable information in as many languages as possible to help contain the spread of the virus. In Quebec, the Interpreters Bank (Centre intégré universitaire de santé et de services sociaux de la Capitale-Nationale, n.d.), a free of charge service to facilitate meetings with health care practitioners, started to offer interpretation by phone and video conference via platforms such as Teams and Zoom.

Despite the impressive volume of multilingual messaging that has been produced by such initiatives, many immigrant communities with sizable Canadian populations remain poorly served. To take just one example, an estimated 7,000 speakers of Harari live in Toronto (Endangered Language Alliance Toronto, n.d.b.), the largest Harari population outside of East Africa. Yet we know of no readily available information on COVID-19 in the Harari language. Skeptics may argue that a multilingual community such as the Harari, whose members typically speak Ethiopia's predominant national language, Amharic, in addition to their mother tongue, can safely rely on their knowledge of other languages for critical updates on the pandemic. This misses the point.

For a message to be credible and acted upon rather than simply transmitted, it must come from a trusted voice and in a mother tongue. Knowing this, public health agencies all over the world have been working tirelessly to identify community leaders who can help to spread reliable information (García et al. 2020, p. 40). As the world moves towards widespread vaccination, the threat posed by the "infodemic"—the proliferation of inaccurate information undermining public trust in scientific facts (World Health Organization et al. 2020)—should not be underestimated. Reaching out to communities in their mother tongues is a critical element in a successful vaccination campaign.

Creating and disseminating public health messaging in community languages (National Health Service, n.d.) is one challenge; ensuring language access in life-and-death health care settings is

quite another. In cities across Canada and the US, people hospitalized after contracting the virus found themselves isolated and without the comfort of visits from family members—individuals who, under other circumstances, might have served as trusted and accurate, if unofficial, medical translators (Banas et al. 2017; Hilder et al. 2017). This new reality of forced distance has had profound implications for both patients and health care workers working through language barriers (Rizvic 2020) in medical settings.

Our Languages of New York City map (Mapping Linguistic Diversity, n.d.b.) is already being used to identify the public service needs of urban language communities (Daurio et al. 2020, pp. 10–11). Canada's multilingual metropolises would benefit from a similar, ground-up approach to language mapping. An advantage of an interactive map like ours, particularly during a pandemic, is its capacity to combine geospatial data provided by municipal, provincial and federal agencies—whether public health, centers for disease control or census and statistics—with language distribution data to visualize patterns of vulnerability. Public data that can be cross-referenced with language data include, among many other variables, the percentage of uninsured households, the percentage of crowded households or those estimated to have more people than rooms as well as the percentage of households with people 65 years of age and older.

Incorporating such information into an interactive language map also offers clues for understanding why it may be that linguistically rich urban areas have been hit particularly hard with COVID-19 and can help target public service delivery to the most seriously affected neighborhoods through focused translation into specific languages.

If it is clear, for instance, that there are many socio-economically precarious households within a five-block radius, then such information would help municipal and community organizations develop messaging in languages predominantly spoken in those neighborhoods about how these communities can best access health services. The challenges in actually making this happen are many, from triangulating the data to making and disseminating the messages, but there is no doubting the need.

The fast-moving COVID-19 pandemic illustrates the importance of community-based language mapping and highlights the ever more urgent requirement for attending to the spatial relationships underlying the diversity of language landscapes, including those in urban areas, and committing to mapping languages in ways that are more representative, collaborative and participatory.

Language maps, whether in print or online, need to represent more than just points or polygons. There is great potential for using GIS and data visualization tools for illustrating the complexity of language practices, language mobility and linguistic identities here in Canada. Our collaborative approach to language mapping offers ways to explore how linguistic geographies intersect with health disparities and other social vulnerabilities. Underlying our partnership is a shared goal: identifying the role of maps for making sense of linguistic diversity and marginalization so that resources can be better mobilized to address and mitigate entrenched inequalities.

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Recommendations

Woven through the articles included in this report are recommendations for supporting the language and literacy development of our population. Here, we summarize 16 recommendations for different stakeholders.

Caregivers & Communities

Language and literacy development begins at home, in infancy, and in caregiver-child interactions. Broadly, we recommend that caregivers continue to support their children's language and literacy development by:

1. Providing rich, one-on-one, back-and-forth social interactions, whether these be in-person or virtually;
2. Establishing a healthy reading and writing routine, and keeping children engaged during these activities by, for example, elaborating on the words and how their meanings connect to tell a story;
3. Monitoring screen time and learning about apps recommended by teachers and researchers for language development;
4. For children in multilingual households, where it is important to the family to maintain the languages, ensuring that caregivers speak and communicate in both/all languages from an early age.

Educators

Outside the home, childcare workers and teachers play an important role in developing children's language and literacy skills. During the pandemic and beyond, educators can support children's language and literacy development by:

5. Continuously monitoring the language and literacy development of children with diverse language experiences;
6. Connecting and collaborating with parents about their children's progress;
7. Providing education on digital literacy to all children so that they can use digital tools safely and productively;
8. Using features of online learning to support learning, e.g., breakout rooms, screen shares and the like.

Researchers

Researchers can work toward creating new knowledge and programs to support children's language and literacy skills. We recommend that they do so by:

9. Fostering collaborations between academics, clinicians, and teachers, so that new knowledge can be applied to practice directly;
10. Fostering collaborations between academics and industry partners in developing high-quality, evidence-based educational apps;

11. Developing new research programs that address questions raised by the pandemic, including investigating the effects of screen time, face masks, and online learning on language and literacy development;
12. Collecting data from more diverse populations.

Community Organizations & Policymakers

Community organizations and policymakers have the responsibility to introduce policies that will support early language and literacy skills. Our broad recommendations include:

13. Equipping people with critical thinking and research skills to identify, question, and evaluate information that they are receiving;
14. Promoting positive attitudes toward bilingualism and increasing the availability of second language and heritage language programs in public schools;
15. Dealing with the critical shortage of licensed childcare spaces, for example through the provision of universal childcare;
16. Reducing inequities that disadvantage sections of our population and rethinking policies around language access.

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