American Sign Language and Early Intervention

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The Canadian Modern Language Review / La revue canadienne des langues vivantes, Volume 64, Number 4, June / juin 2008, pp. 581-604 (Article)

Published by University of Toronto Press

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Abstract: Since the beginning of the twenty-first century, the introduction in several countries of universal neonatal hearing screening programs has changed the landscape of education for deaf children. Due to the increasing provision of early intervention services for children identified with hearing loss, public education for deaf children often starts in infancy. While infant hearing screening and intervention programs hold promise for enhancing deaf children's language development, concerns have been raised that these programs may not provide a well-informed or adequate range of options for families with deaf children. In particular, Ontario children who receive cochlear implants have frequently not been provided with support for learning American Sign Language (ASL), despite evidence for the benefits that learning ASL confers on spoken and written English language development in deaf children. This paper presents an applied linguistics perspective on early intervention policies and programs for deaf children.

Keywords: American Sign Language, early intervention, deaf bilingual education

Résumé : Depuis le début du XXI^{e} siècle, plusieurs pays ont mis sur pied des programmes de dépistage universel des troubles de l'audition chez les nouveau-nés, ce qui a entraîné des changements radicaux dans l'éducation des enfants sourds. Dorénavant, l'accroissement des services d'intervention précoce auprès des enfants identifiés comme ayant une perte auditive permet souvent d'entreprendre l'éducation des enfants sourds dès le plus jeune âge. Bien que le dépistage précoce des problèmes d'audition et les programmes d'intervention représentent des avancées encourageantes pour le développement du langage chez les enfants sourds, il subsiste toutefois des inquiétudes que ces programmes n'offrent pas une gamme d'options adéquates ou disponibles aux familles d'enfants sourds. En particulier, dans le cas de l'Ontario, les enfants qui ont un implant cochléaire ont souvent été déniés le support de la Langue des signes américaine (ASL), bien qu'il ait été démontré que l'apprentissage de l'ASL a des effets bénéfiques sur le développement de l'oral et de l'écrit en anglais chez les enfants sourds. Cet article présente une perspective des politiques et des programmes d'intervention précoce pour les enfants sourds du point de vue de la linguistique appliquée.

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Mots clés : Langue des signes américaine, intervention précoce, éducation bilingue des enfants sourds

Introduction

In countries that have most quickly embraced cochlear implants for deaf children, research on the development of signed language appears to be slowing (Schick, Marschark, & Spencer, 2006). At the same time, the body of knowledge concerning signed languages and signed language acquisition has expanded at an impressive pace, in particular since research in signed language linguistics began with the publication of *A Dictionary of American Sign Language on Linguistic Principles* by Stokoe, Croneberg, and Casterline in 1965 (Padden & Humphries, 2005; Schick et al.). Although researchers have arrived at a general consensus regarding the advantages for deaf children of learning a signed language early in childhood, there is concern that Canadian public policy is not keeping pace with these developments. In particular, Cripps and Small (2004) have identified a number of issues related to the Ontario government's Infant Hearing Program (IHP) and its lack of explicit policy regarding the provision of American Sign Language (ASL) services to deaf infants and young children who receive cochlear implants.

Established in May 2000, the IHP provides universal infant hearing screening and early intervention services to young children with hearing loss and to their families (Hyde, 2002). As the first public initiative of this kind in Canada, the IHP is part of a larger network of universal infant hearing screening programs that were introduced in several countries at the beginning of the twenty-first century. Prior to the introduction of this technology, it was rare for an infant to be identified as deaf in the first year of life (Meadow-Orlans, 2004). The significance of early identification of hearing loss and the provision of intervention services lies in the implications for the early education of deaf children – many of whom are at risk of delays in language development regardless of the degree of their hearing loss (Spencer, 2004). Spencer notes that there is nothing inherent in hearing loss that restricts language development. Delayed language development of deaf children is often a result of their delayed exposure to a visual language that they can access and process effectively (2004). Yet, as I will show in this paper, concerns have been raised that the decision-making bodies that set policy for the early education of deaf children are not guided by relevant research on deaf children's language

acquisition or bilingual development, and early intervention programs may not provide a well-informed or adequate range of options to parents and children.

This paper presents a discussion of systematic barriers to learning ASL[1] that are faced by young deaf children and their families. Three main points will be addressed: (a) the profile of deaf children, specifically related to language acquisition and bilingual development; (b) the role of the IHP in promoting language learning; and (c) how early intervention services might better support learning of ASL by deaf children and their families. The literature reviewed in this paper refers mainly to children with severe to profound levels of hearing loss, defined by Goldin-Meadow and Mayberry (2001) as a hearing-loss range of range of 70 to 90 decibels and above. However, hard-of-hearing children – who are also the subject of this paper – span a wide range of audiological thresholds, from 30 to 90 decibels of hearing loss (Blamey, 2003).

Background

In Canada and the United States, education for deaf students has often followed a monolingual philosophy (Gibson, Small, & Mason, 1997). Historically, this has meant a failure to support the use of the deaf community's native signed languages in classrooms or educational programs for deaf students. This is due to a widespread conception that learning a signed language hinders the development of spoken and written language skills. Deaf children, however, lack access to the same auditory base for acquiring a spoken language that hearing children have (Goldin-Meadow & Mayberry, 2001). Even young children with a relatively mild degree of hearing loss have been shown to be at risk for difficulties in language development; this is due to their limited access to language through the auditory channel (Bess, Dodd-Murphy, & Parker, 1998; Meadow-Orlans, Mertens, & Sass-Lehrer, 2003; Spencer, 2004). Consequently, many young deaf children do not receive full and timely access to language in any modality.

In Ontario, public support for learning ASL has not been available for infants and young children with cochlear implants. Allegedly, the rationale for this phenomenon is that practitioners of auditory-verbal therapy (AVT) are opposed to deaf children's learning signed language (Cripps & Small, 2004). AVT, an intervention for children with hearing loss, emphasizes spoken language development through early identification, amplification, and intensive speech therapy.

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Among the primary goals of this approach to intervention is the fostering of educational and social inclusion with hearing peers (Eriks-Brophy, 2004).

Currently, Ontario's two children's hospitals[2] require deaf children who undergo cochlear implant surgery to enrol in AVT. According to the senior program consultant of the IHP, auditory-verbal therapists refuse to treat children who are learning signed language (M. Stein, letter to the Ontario Association of the Deaf, August 23, 2006). However, the decision to deny public funding of ASL services for children with cochlear implants has appeared to be an operational, if not explicit, IHP policy (Cripps & Small, 2004). In fact, ASL services are available to other Ontario families with deaf children through part-time family ASL instructors under contract with the IHP.

Profile

The majority of deaf children in Canada and the United States are born to hearing parents who have little or no knowledge of signed language. These children are not exposed to a fully accessible language until later in life (Emmorey, 2002; Israelite & Ewoldt, 1992; Johnson, Liddell, & Erting, 1989; Prinz & Strong, 1998). According to Akamatsu, Musselman, and Zweibel (2000), 93% of severely to profoundly deaf children in Ontario had initially been enrolled in auditory-oral intervention programs, and 67% of deaf pre-school children had been educated orally; the figures dropped to 58% for children in elementary school and 31% for students in high school (cited in Cripps & Small, 2004). Between the early pre-school years and adolescence, 62% of deaf children shifted from oral programs to programs with sign support or ASL (Akamatsu et al., 2000). These statistics indicate that the majority of deaf children are deprived of access to a full language when they begin school, and they fall steadily behind their hearing peers through each grade – a conclusion supported by Johnson et al. (1989) and by Kuntze (1998). As a result, deaf students are often transferred for remedial instruction in a signed language environment after losing valuable years of language learning. Although the study by Akamatsu et al. (2000) was conducted prior to the establishment of infant hearing screening and early intervention services in Ontario, no follow-up studies have been published to date to provide evidence that the educational profile of most deaf children has significantly changed.

Researchers have documented the effects of delayed first language (L1) acquisition on deaf people's language performance and

processing skills (Mayberry, 1993; Mayberry & Eichen, 1991; Newport, 1990, 1991). In fact, research with deaf individuals who acquired a signed language at different ages has been used to demonstrate what is called the 'critical period hypothesis' – which has been difficult to test among hearing children who are normally exposed to a first language from birth (Mayberry, 1993; Newport, 1990, 1991). Other researchers use evidence from studies of ASL learners of different ages to describe innate constraints on learning (Emmorey, 2002; Mayberry, 1994; Morford & Mayberry, 2000). These studies not only support the idea of a critical period for language learning but also indicate that delayed L1 acquisition has more detrimental long-term effects than acquiring a second language late in childhood (Emmorey, 2002).

Lack of access to a signed language environment – not any inherent deficiencies in deaf children's language learning or developmental abilities – underlies the problems faced by deaf late L1 learners. Natural signed languages, such as ASL and the Langue des signes québécoise (LSQ), demonstrate the same linguistic properties as spoken languages, including phonetic, phonemic, syllabic, morphological, syntactic, discourse, and pragmatic levels of organization (Newport & Meier, 1985; Petitto, 1994). Deaf children who are exposed to ASL or LSQ from birth acquire these languages on a maturational time line that is identical to that of hearing children who acquire English or French (Petitto, 2000). Other researchers corroborate these findings regarding the normal attainment of all linguistic milestones by deaf children exposed to signed language (Morford & Mayberry, 2000; Newport & Meier; Schick, 2003; Spencer, 2004; Volterra & Iverson, 1995). From birth to age three and beyond, speaking and signing children exhibit identical stages of language acquisition, including the syllabic babbling stage (7 to 11 months), the first-word stage (11 to 14 months), and the first two-word stage (16 to 22 months) (Petitto, 2000).

These findings regarding the normal language development of infants exposed to signed language are supported by substantial research that documents the superior performance of deaf children of deaf parents, as compared to deaf children of hearing parents, on tests of academic achievement, reading, writing, and social development (e.g., Kourbetis, 1987; Weisel, 1988). A review of this literature by Israelite and Ewoldt (1992) shows that native ASL users have higher English literacy abilities than deaf children who learn ASL later in life. These findings across multiple studies demonstrate consistently superior results for deaf children of deaf parents, despite the lower socio-economic status of these parents (Zweibel, 1987). Newport and

Meier (1985) also observe that deaf children of deaf parents have superior English literacy abilities compared to deaf children of hearing parents, despite the fact that English is not the native language of deaf children of deaf parents and that most children of hearing parents receive more intensive auditory-oral training in English. More recent studies of highly ASL-fluent deaf children of hearing parents suggest that a well-developed language foundation in ASL enables deaf students to reach higher levels of English literacy regardless of parental hearing status (Singleton, Supalla, Litchfield, & Schley, 1998; Strong & Prinz, 1997, 2000).

There has been debate on whether young children exposed to signed language exhibit a linguistic advantage over children exposed to spoken language only (Anderson, 2006), but this notion has been disputed by Volterra and Iverson (1995) and Volterra, Iverson, and Castrataro (2006). These researchers argue that all children use pre-linguistic gestural communication in the earliest stages of language development, and this fact has, erroneously, been taken for a signed language advantage (Volterra & Iverson, 1995; Volterra et al., 2006). In deaf children exposed to signed language from birth, language development is strikingly parallel to language development in hearing children exposed to spoken language (Volterra & Iverson, 1995; Volterra et al., 2006). However, a two-year longitudinal study by Goodwyn, Acredolo, and Brown (2000) of more than 130 families with hearing infants suggests that increased exposure to symbolic gesturing improves the development of infants' receptive and expressive spoken language (cited in Volterra et al., 2006). Abrahamsen (2000) argues that increased exposure to gestural input does not accelerate children's first-word production in either signed or spoken languages but can facilitate vocabulary growth in later stages of language development. Enhanced experience with gestural communication clearly does not interfere with, and may actually facilitate, spoken language development (Volterra et al., 2006). However, compared to hearing children and deaf children exposed to signed language from birth, deaf children who are exposed to gestural communication only – that is, without the systematic linguistic input provided by a natural signed language – exhibit delays in their language development (Volterra et al., 2006).

Bilingual proficiency and signed language

Research demonstrates the consistent benefits of early signed language acquisition by deaf children and refutes the position that learning

ASL hinders spoken or written English development. Studies show that the learning of signed language has a positive effect on young deaf children's spoken language skills (Preisler, Tvingstedt, & Ahlström, 2002; Schlesinger & Meadow, 1972; Yoshinaga-Itano & Sedey, 2000). One of these studies evaluates childhood cochlear implants. Over a two-year period, Preisler et al. (2002) studied the patterns of communication of 22 pre-school children who had received cochlear implants between the ages of two and five. This research took place in Sweden, where parents are required to establish some signed language communication with their children in order for the child to be considered for a cochlear implant (Swedish National Board of Health & Welfare, 2000). Preisler et al. observed that the children who developed the most spoken language also had well-developed signed language skills. Although signed language by itself did not guarantee the development of spoken language, those children who had insufficient, or discontinued, signed language development also had very little, or no, spoken language abilities. It was also observed that when children with little signed language improved their signed language abilities, their spoken language also increased (Preisler et al., 2002).

Yoshinaga-Itano and Sedey (2000) investigated the relationship between speech development and various demographic and developmental factors, including mode of communication, in children aged 14 to 60 months. The researchers found that expressive signed and spoken language ability was a significant predictor of speech development in young deaf and hard-of-hearing children. Earlier studies also showed a significant relationship between linguistic ability – including verbal communication intentions, mastery of rules of syntax, and strong skills in vocabulary and semantics – and speech intelligibility in deaf children (cited in Yoshinaga-Itano & Sedey, 2000). While access to a signed language is thought to increase overall linguistic ability in deaf children, it has been clearly shown to increase vocabulary levels (Anderson, 2006; Watkins, Pittman & Walden, 1998). Blamey (2003) makes the link between high-level linguistic competence and speech perception ability in deaf and hard-of-hearing children with hearing aids and cochlear implants. He reviewed studies that compare the speech perception ability of deafened adults with those of deaf and hard-of-hearing children; the scores are lower for children than for deafened adults, even among children who have more residual hearing (e.g., Blamey et al., 2001). In order for deaf and hard-of-hearing children who have hearing aids and cochlear implants to comprehend spoken language input,

an advanced knowledge of phonology, syntax, and semantics is needed (Blamey, 2003).

Preisler and Ahlström (1997) found that the use of signed language positively affects language development and social and emotional development among pre-school hard of hearing children. The children in their study were bilingual in spoken Swedish and Swedish sign language, and they exhibited flexibility in their use of the two languages. These children used patterned and purposeful code-switching to match the requirements of their communication partners. In addition, the communicative context of this study is mirrored in other studies of young bilingual hearing children who show differential and appropriate use of their developing languages (e.g., Genesee, Nicoladis, & Paradis, 1995; Comeau, Genesee & Lapaquette, 2003).

Paradis and Crago (2006) note that bilingualism is often considered inappropriate for children with specific language impairment (SLI), which is considered a developmental language disorder that also occurs in children with normal hearing, social-emotional development, and non-verbal intelligence (Paradis, Crago, & Genesee, 2006). It is widely assumed that children with SLI will be negatively affected by learning two different linguistic systems, owing to their more limited language capacity (Paradis & Crago, 2006). Yet empirical studies show that bilingual children, either with or without SLI, attain levels of grammatical ability comparable to those of their monolingual peers, and the learning of more than one language in childhood does not increase complications for children with SLI (Paradis & Genesee, 1996; Paradis, Crago, Genesee, & Rice, 2003; Paradis et al., 2006). Deaf children by definition do not suffer from SLI, but they are often inappropriately categorized because of the difficulties they face in a monolingual spoken-language environment. Arguably, these children should be able to achieve the same success in dual language learning when one language is a signed language and when there is sufficient access to the majority language.

Proficiency in ASL, as well as positively influencing spoken language development, has been shown empirically to support English literacy in deaf students (Hoffmeister, 2000; Padden & Ramsey, 1998, 2000; Singleton et al., 1998; Strong & Prinz, 1997, 2000). This body of research, which shows a positive correlation between high levels of ASL proficiency and English literacy skills, is also supported by earlier literature that demonstrates that native ASL users have higher English literacy abilities than deaf children who learn ASL later in life (Israelite & Ewoldt, 1992). One hypothesis is that ASL functions like any other first language when the task is to

learn a second language (Goldin-Meadow & Mayberry, 2001; Hoffmeister, 2000; Morford & Mayberry, 2000). The interdependence hypothesis (Cummins, 1981) refers to the transfer of proficiency in an L1 to proficiency in an L2, which applies in the case of ASL and English. However, Mayer and Wells (1996) present a theoretical argument against the applicability of the interdependence hypothesis in this regard. They argue that the interdependence hypothesis assumes that (a) the language learner has acquired a written version of the L1 that can support literacy in the L2; and/or (b) there is access to the spoken form of the L2. However, this is not the case for a large proportion of deaf students. Instead, there is a 'double discontinuity' between ASL and English; therefore the conditions assumed by the hypothesis cannot be met, and ASL does not support the learning of English (Mayer & Wells, 2006). The claims of Mayer and Wells are not, however, empirically supported by the research studies mentioned above. Cummins (2005) explicitly states that the interdependence hypothesis refers not only to the development of language skills such as decoding written text but also to 'a deeper conceptual and linguistic proficiency that is strongly related to the development of literacy in the majority language' (p. 4). Cummins lists five types of possible transfer from the first to the second language, depending on the sociolinguistic situation:

1. transfer of conceptual elements,
2. transfer of metacognitive and metalinguistic strategies,
3. transfer of pragmatic aspects of language use,
4. transfer of specific linguistic elements, [and]
5. transfer of phonological awareness (p. 5).

Additionally, Cummins refers to the applicability of the interdependence hypothesis in the context of dissimilar languages, such as English and Turkish, where 'transfer will consist primarily of conceptual and cognitive elements (e.g., learning strategies)' (2005, p. 5). However, which types of transfer may apply in the case of ASL and English is an area that merits further study. For instance, Padden and Ramsey (1998, 2000) discuss the role of fingerspelling and other ASL-based bridging techniques that may encourage transfer of specific linguistic elements as well as provide a visual phonological bridge (Haptonstall-Nykaza & Schick, 2007).

Nonetheless, a separate underlying proficiency model (SUP) of bilingual development is often assumed in early intervention and pedagogical approaches for deaf children (Cummins, 2001).

For instance, Fjord (1999) describes how American audiologists and otologists consistently present the image of signed languages taking over the brains of deaf children. For this group of professionals, the use of a signed language inflicts damage on the brain, causing 'visual areas to take over areas allocated to speech' and 'neural atrophy of auditory pathways' (p. 135). Hyde (2002), writing for an Ontario Ministry of Health newsletter, states that the 'significant changes in the structural and functional organization of the auditory system, up to and including the cerebral cortex,' are caused by 'auditory deprivation in early infancy' (p. 176). According to Fjord, this ominous view of hearing loss and signed language is related to studies involving the brain scans of adult signed language users, which show that signed languages stimulate brain substrates in ways that are similar to spoken languages. Also, aphasias in the left hemisphere of the brain affect signed language grammar and spoken language grammar in the same way (Bellugi, 1980; Neville & Bellugi, 1978). Although these studies can be taken as evidence for the linguistic wholeness of signed languages, medical professionals and AVT advocates have focused on results that show the reallocation of auditory areas for visual processing in the brains of adult deaf signed language users (Neville, 1988, 1991). The perceived effects of hearing loss and visual language on brain development become an argument for AVT, in which reliance on vision and signed language is prohibited (Fjord, 1999). Hence, American and Canadian audiologists and otologists have not supported the concept of bilingual education in ASL and English for deaf children (Fjord, 1999).

Infant hearing screening and early intervention programs

There is a general consensus among researchers that hearing loss in young children needs to be detected as early as possible to enable children to have an optimum access to language. Identification of hearing loss in infancy, followed by an appropriate intervention by the age of six months, can result in normal language development (Anderson, 2006; Arehart & Yoshinaga-Itano, 1999; Schick, 2003; Yoshinaga-Itano, Sedey, Coulter, & Mehl, 1998). As cited in Arehart and Yoshinaga-Itano (1999), the six-month deadline for intervention is supported by evidence from two large-scale studies of deaf and hard-of-hearing infants in Colorado (Apuzzo & Yoshinaga-Itano, 1995; Yoshinaga-Itano et al., 1998). Children identified with hearing loss by six months of age have significantly higher receptive and expressive language skills than children with later-identified hearing loss

(Anderson, 2006; Arehart & Yoshinaga-Itano, 1999). Yoshinaga-Itano (2006) proposes that the age of identification does not directly result in improved speech production in deaf children but does positively influence language development. When children are able to produce lexical and grammatical units of language, regardless of modality, they have a framework for developing spoken language articulation skills.

Prior to the introduction of technology by universal hearing screening programs, the identification of deaf and hard-of-hearing children was often delayed. Spencer (2004) notes that before the beginning of the twenty-first century, deaf and hard-of-hearing children with hearing parents often experienced significant language delays before intervention services were initiated. The Ontario government established the Infant Hearing and Communication Development Program in May 2000 (Hyde, 2002) after a study by Durieux-Smith and Whittingham (2000) had determined that between 1991 and 1995 in Ontario the mean age of diagnosis of hearing loss was 2.8 years of age. According to an article provided by Hyde, Friedberg, Price, and Weber (2004) as orientation to the IHP, families with infants identified as having hearing loss 'receive . . . evidence-based, unbiased information about communication development options' including 'amplification, auditory-verbal therapy, sign language training, or a combined approach' (p. 5).

However, there is growing concern among researchers that current early-intervention programs do not provide a well-informed or adequate range of options for parents and deaf children (Anderson, 2006; Arehart & Yoshinaga-Itano, 1999; Sass-Lehrer & Bodner-Johnson, 2003). They argue that educators of deaf and hard-of-hearing children with knowledge of signed language, as well as educators of auditory and speech skill development and the impact of hearing loss on speech, language, and socio-emotional development, need to become integral to the intervention systems. Arehart and Yoshinaga-Itano (1999) cite a study by the Marion Downs National Center of 17 states that have universal newborn hearing screening programs and intervention sites: only 30% of early intervention programs had an educator of deaf children on staff (Arehart, Yoshinaga-Itano, Thomson, Gabbard & Stredler-Brown, 1998). Similarly, Sass-Lehrer and Bodner-Johnson (2003) cite a study that reports that most early intervention programs do not provide any information about deaf culture (Stredler-Brown & Arehart, 2000). In fact, most early education providers for young deaf children have a background in speech-language pathology rather than deaf education (Sass-Lehrer & Bodner-Johnson, 2003; Stredler-Brown & Arehart, 2000).

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A systematic absence of deaf education professionals and deaf adults among Ontario IHP administrators and staff members is also apparent. A recently posted opening for the position of manager of the IHP coordinating agency at the Markham-Stouffville Hospital stipulated a 'Master's degree in Speech Pathology or Audiology' and 'current registration with the College of Speech Language Pathologists and Audiologists' as the chief qualifications. In addition, the IHP family support workers, who meet with parents of identified deaf or hard-of-hearing infants to provide information about early intervention options, are hearing professionals with backgrounds in social work. Yet social work programs, like speech-language pathology and medical training programs, generally do not provide their students with in-depth information about deaf people or signed language. As Fjord (1999) notes, such professionals can only become competent according to the values that are transmitted to them by society and their training. The otologists interviewed by Fjord stated that their training did not prepare them for working with deaf people, nor did it provide any information about signed language. Similarly, Cripps and Small (2004) found that the IHP family support workers reported that they are not sure how to respond to parents' questions about learning ASL or the effects of ASL on speech development and learning English.

Cochlear implants and signed language

As Cripps and Small (2004) note, the IHP's supposed options for deaf infants and their families become a moot point when the cochlear implant teams at two of Ontario's children's hospitals require families to provide AVT and thereby reject ASL for their children. Accordingly, the IHP has not funded ASL services for children who receive AVT. Such a prohibition on signed language for deaf children with cochlear implants is part of what Fjord (1999) describes as the long history of educators and medical professionals constructing a binary opposition between spoken language and signed language. This constructed opposition also represents a version of the separate underlying proficiency model (Cummins, 2001) whereby the learning of a signed language is perceived to inhibit spoken English development. The research presented in this paper, however, refutes this view.

Despite the broad implementation and public support for childhood cochlear implants and AVT to support L1 acquisition in deaf children, the efficacy of these procedures is inconclusive (Eriks-Brophy, 2004; Goldin-Meadow & Mayberry, 2001; Hyde, 2002;

Spencer & Marschark, 2003). Eriks-Brophy's review of studies evaluating AVT notes that research on AVT tends to be retrospective and anecdotal in nature and is often based on a small, self-selected group of participants. In the author's words, 'This evidence would be classified as providing only limited support in favour of AVT as a treatment approach' (p. 30). Research on AVT also lacks a measure of the children's functioning across multiple domains, including social and emotional development (Eriks-Brophy, 2004). Part of a longitudinal study of deaf and hearing infants and parents found that a mother's use of signed language and gesture when a child is 12 months old is strongly related to the infant's language progress social interaction, and visual attention patterns at 18 months old (Meadow-Orlans, Spencer, Koester, & Steinberg, 2004). These writers conclude,

> Our research suggests that a strict adherence to an auditory-verbal regimen that decreases visual input, although it may be successful with a limited number of children or as an approach to speech therapy, is likely to delay the general language and social development of children with a hearing loss, especially those whose loss is severe or profound. (p. 224)

Cochlear implants can improve access to sound and speech perception and production (Blamey, 2003; Blamey et al., 2001; Preisler et al., 2002). However, the outcomes of cochlear implants in young deaf children are 'uneven and unpredictable' (Meadow-Orlans et al., 2004, p. 219). Cochlear implants do not transform a deaf child into a hearing one. Most deaf children with cochlear implants are functionally hard of hearing (Blamey, 2002; Blamey et al., 2001; Schick et al., 2006; Spencer, 2002; Spencer & Marschark, 2003).

Hard-of-hearing children face severe developmental, communication, and educational difficulties (Blamey, 2003; Preisler, 1999; Preisler & Ahlström, 1997; Schick et al., 2006). Blamey et al., 2001 cites data from one study of 87 primary school children that found the average rate of spoken language development for children with hearing aids and cochlear implants is about 55% of the rate for normal spoken language development in hearing children. Blamey (2003) also states that 'a hard-of-hearing child has about 40–60% of the learning opportunities of a hearing child' because of limited auditory experiences, and, as a consequence, his or her 'learning rate is about 40–60% of normal' (p. 241). The social and emotional development of hard-of-hearing children is similarly affected. Antia and

Kreimeyer (2003) report that because of a more limited spoken language ability, both deaf and hard-of-hearing children interact less frequently with hearing peers, spend less time in interaction, and engage in briefer interactions than hearing children do. Preisler and Ahlström (1997) found that their study group of hard-of-hearing children, between two and seven years old, lacked knowledge of rules for communication, including turn taking and making eye contact.

Hard-of-hearing children and deaf children with cochlear implants also benefit from exposure to a signed language (Preisler, 1999; Preisler & Ahlström, 1997; Spencer, 2002). Perhaps, especially for this group of children with some hearing abilities, acquiring a signed language early in childhood can assist spoken language development in significant ways. Yoshinaga-Itano (2006) cites three case studies of infants, involved with the Colorado Home Intervention Program, who acquired ASL and simultaneously received cochlear implants and auditory-oral stimulation. These young children's broad ASL vocabularies became a foundation for developing spoken English word perception and production skills.

A model can be envisioned for simultaneous bilingualism in ASL and English for deaf children with cochlear implants, but individual proficiency and progress in spoken language may still be varied. Some of the most compelling evidence for this model comes from a longitudinal study of Swedish deaf children with cochlear implants, reported by Preisler, Tvingstedt, and Ahlström (2002, 2005). In 2005, these researchers interviewed 11 children with cochlear implants (aged 8.5 to 10.5) about their experiences. At the time of the study, the children had been using their implants for five to seven-and-a-half years. Six of these children attended schools for the deaf and five were in mainstream classes. Owing to the Swedish model of deaf education, where signed language has been the official language of instruction since 1981, these children and their families used Swedish sign language in addition to spoken language (Preisler et al., 2002, 2005). In the earlier study (Preisler et al., 2002), parents mainly used signed language with their young children and then later introduced more spoken language. According to the Preisler et al. (2005) study, children who were enrolled at schools for deaf students expressed no difficulty in understanding what was said in the classroom environment. However, children in mainstream classrooms, where spoken Swedish was used, had more difficulties understanding their teacher and communicating in a group environment. This observation was consistent with comments made by the parents and teachers. With impaired hearing, it is more difficult to create meaning and coherence

from spoken language utterances. Therefore, Preisler et al. (2005) the study authors expressed concern regarding students' need to develop linguistic competence for an increasing abstraction in higher education. Mainstream classroom environments that do not provide exposure to signed language may not support the fluency needed for full linguistic competence.

The description by Preisler et al. (2005) of the difficulties that a mainstream classroom environment poses for deaf children with cochlear implants is corroborated by researchers in other countries (e.g., Knecht, Nelson, Whitelaw & Feth, 2002; Shield & Dockrell, 2004). According to these researchers, even when children with cochlear implants are able to hear within normal limits for some situations, the high noise levels in most classrooms prevent easy understanding of speech. Excessive noise levels and high reverberation in classrooms can negatively impact the performance of hearing children, but children with hearing loss are most at risk for difficulty in noisy classrooms (Picard & Bradley, 2001).

Theoretical and practical implications

Among hearing children, the development of English literacy is preceded not only by the acquiring of language skills, including metalinguistic and phonological awareness, but also by having a broad L1 vocabulary and opportunities for verbal interaction (Snow, Burns, & Griffin, 1998). The development of L1 expertise among minority-language children is crucial to their learning how to read in English (Snow et al., 1998). Since an impoverished L1 foundation is often the source of difficulty that beginning deaf readers experience, and because there is a strong relationship between ASL proficiency and English literacy among deaf students, educational and intervention programs for young deaf children should be designed to facilitate emerging literacy in both languages.

Involving ASL-proficient deaf adult professionals in early intervention and education programs can facilitate opportunities for language-based interaction, language play, and sharing ASL literature with young deaf children. Successful models for this type of program have been established in Canada and the United States (Cripps & Small, 2004; Roberts, 1998; Watkins et al., 1998). In a groundbreaking Deaf Mentor Experimental Project in Utah, deaf adults made regular home visits to young deaf children and their families to share their knowledge of ASL and deaf culture and to serve as role models (Watkins et al., 1998). The group of deaf children who received deaf

mentor services was matched to a control group of children and parents in Tennessee who received spoken or manually coded English services only. On average, during the treatment time, the Utah children had greater gains in receptive and expressive language than those in the Tennessee control group. Moreover, the Utah children who had exposure to ASL scored more than 2.5 times higher on a test of English grammar than the Tennessee children. Children in the Utah deaf mentor program developed vocabularies more than twice as large as those of the matched children in Tennessee, and the parents used more than six times as many signs as the parents in Tennessee.

A Deaf Mentor and Outreach ASL Program at the Sir James Whitney School for the Deaf, Belleville, Ontario, was begun in 1993 to provide services to families on the pre-school home visiting caseload (Roberts, 1998). The Ontario Cultural Society of the Deaf began an ASL and Early Literacy Consultant Program in 2001 with the goal of developing province-wide standards and training for deaf family ASL instructors and ASL and early literacy resources for parents and children (Cripps & Small, 2004). In 2002, the IHP provided three years of start-up funding to assist with training, materials development, and referrals for ASL and early literacy consultants. However, funding for this infrastructure ceased in March 2005. The IHP coordinating agencies still contract family ASL instructors to assist families who request ASL services. However, bilingual ASL and English programs and resources for young children have not been consistently supported by the IHP, and there has been no system for oversight or referrals of family ASL instructors. As a result, very few young deaf children in Ontario currently access ASL services. Public policy regarding the provision of ASL services should be based on empirical evidence regarding bilingual development in deaf children. The position of AVT practitioners that deaf children's learning of signed language is incompatible with learning spoken language has little credibility in view of a large body of research in applied linguistics.

Conclusion

Cripps (2000) avows the rights of deaf children to acquire bilingualism in a signed language and the majority language, and also to access the deaf community and the cultures of their parents and the majority society. Based on the literature reviewed in this paper, a strong case can be made for integrating ASL and LSQ as an essential part of the model of early deaf education promoted by the Canadian government and government agencies. Facilitating deaf children's acquisition

of a signed language enables their access to full linguistic input, which in turn promotes written and spoken language development. Further research is needed to develop a best-practices model of bilingual education for young deaf children and to demonstrate how Canadian governments can better support the bilingual development of these children.

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Acknowledgements

Sections of this paper are based on a discussion paper commissioned by the Ontario Association of the Deaf.

Notes

1 While most of the literature reviewed in this paper deals with ASL and English, for the most part Langue des signes québécoise (LSQ) and French can conceptually be substituted for the former two languages.
2 The Hospital for Sick Children in Toronto and the Children's Hospital of Eastern Ontario in Ottawa. The Children's Hospital of Western Ontario in London does not require AVT for children who undergo cochlear implant surgery (S. Weber, personal communication, April 25, 2008).

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