Language Planning for the 21st Century: Revisiting Bilingual Language Policy for Deaf Children

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For over 25 years in some countries and more recently in others, bilingual education involving sign language and the written/spoken vernacular has been considered an essential educational intervention for deaf children. With the recent growth in universal newborn hearing screening and technological advances such as digital hearing aids and cochlear implants, however, more deaf children than ever before have the potential for acquiring spoken language. As a result, the question arises as to the role of sign language and bilingual education for deaf children, particularly those who are very young. On the basis of recent research and fully recognizing the historical sensitivity of this issue, we suggest that language planning and language policy should be revisited in an effort to ensure that they are appropriate for the increasingly diverse population of deaf children.

With the introduction of newborn hearing screening in many countries, hearing loss in children is being identified earlier in life than ever before. Earlier diagnosis and intervention have had positive effects on deaf children's language development, both signed and spoken, even if they still lag somewhat behind hearing peers (Moeller, 2000; Yoshinaga-Itano & Sedey, 2000). Early screening together with advances in medical technology also has rolled back the age at which children are receiving cochlear implants. Whereas only a few years ago, implantation prior to age 3 was considered "early," it now is common at about 1 year of age, and 3 years is considered relatively late. The frequency of cochlear implantation varies by country and by regions within countries, but it is probably accurate to say that most young deaf children in developed countries are receiving implants nowadays, also contributing to better development of spoken language, on average (Hammer, 2010; Verbist, 2010). At the same time that more deaf children have opportunities to acquire spoken language, there are continuing difficulties of offering them rich and fluent sign language input early in life. This is especially true for the overwhelming majority of deaf children who have hearing parents and teachers. These generalizations do not apply to all children and not equally for each child. Nevertheless, they are pertinent to a sufficient number of deaf children overall that we believe it is important to revisit current language policies and practices relating to the role of early sign language in combination with or in lieu of spoken language.

Revisiting language planning and policy in deaf education will require a reconsideration of the place that sign language holds in the raising and education of deaf children. Importantly, this is not a question of whether natural sign languages such as American Sign Language (ASL) and Sign Language of the Netherlands (SLN) are full languages, whether there is a Deaf community for which sign language is an identifying feature as well as a primary medium of communication, whether sign language and Deaf culture are essential pillars of the Deaf community, or whether growing up with sign language and Deaf

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culture can be valuable for deaf children. For us, all these are true. The issue here is not a political or philosophical one but one of providing deaf children with the best possible opportunities for educational and personal success.

For deaf children, identification with Deaf culture and the Deaf community could be an important part of social–emotional development, akin to growing up with an ethnic or religious affiliation. Such ties might have wider implications for education and social functioning throughout the life span, but there apparently have not been empirical studies in that regard. The second part of the bilingual–bicultural educational model thus remains largely unexplored. Meanwhile, there is the necessity or at least a social desire for deaf children to eventually integrate fully into the larger society. For us, for their parents, and for their future employers, this includes among other things having the best possible proficiency in reading and writing (Knoors, 2008; Marschark et al., 2009). It therefore is important to consider where we have been, what progress we have made in these domains, and how they fit with the reality of deaf children today.

Bilingual Education: Competition and Transfer

Most children begin to acquire language at home through interactions and communication with their parents and expand the language base through social interactions with peers and in school. Largely through informal means, children acquire basic interpersonal communication skills (or BICS: vocabulary, grammar, rules of language usage), whereas schooling helps to develop cognitive academic language proficiency (or CALP: language for reading, writing, learning, and reasoning). For children who grow up bilingual, language skills can be imagined as a double iceberg. BICS in both a first and a second language are found above the waterline, whereas CALP skills that are under the waterline are much larger but less obvious (Mayer & Akamatsu, 2011).

Does one learn a second language easier after mastering a first language? Yes and no. The benefits are not so great in terms of vocabulary and grammar because transfer of language skill is limited mostly to CALP. Further, transfer of such skills does not happen automatically but is bound to conditions that have been described by Cummins (1981, p. 29) this way: "To the extent that instruction in L1 is effective in achieving proficiency in L1, transfer of this proficiency to L2 can occur, provided that there is an adequate input of L2 and one is motivated to learn L2." In other words, a child has to be proficient in the first language (L1) for effective transfer to occur. The child also needs a good input of the second language (L2) and needs to be motivated to learn this second language (Mayer & Leigh, 2010). With regard to deaf children, we suggest that the first two of these conditions, if not all three, are rarely met.

In learning a second language, children clearly benefit from their earlier acquisition of the first language, but the impact of second language learning is not uniformly positive. Bilingualism among unimodal bilinguals (i.e., bilinguals whose two languages are both spoken) affects which features of linguistic systems are learned and how they are utilized in various cognitive processes (see Bialystok & Craik, 2010, for a review). It enhances some aspects of processing, particularly those involved in executive functioning (e.g., Stroop and Simon tasks; Bialystok, Craik, Green, & Gollan, 2009), a challenging cognitive domain for deaf children (but see Emmorey, Borinstein, Thompson, & Gollan, 2008; Emmorey, Luk, Pyers, & Bialystok, 2008, with regard to deaf adults), while recruiting neural networks involved in the control of nonverbal processes, an area of relative strength for deaf individuals (Bialystok, Craik, & Luk, 2008). Studies also have suggested an advantage in working memory for unimodal bilinguals but a clear disadvantage in the retrieval of items from semantic memory (Bialystok & Craik, 2010). At the same time, bilingualism can impede clinical and educational assessment because resulting profiles rarely are accurately captured by monolingual norms (Lukomski, 2002).

Although the time tables for critical targets within and stages of language acquisition are roughly comparable for all children (e.g., Bates & Goodman, 1997; Conboy & Thal, 2006; Kovacs & Mehler, 2009; Pearson, Fernanadez, & Oller, 1993; Petitto et al., 2001), there are differences within those ranges depending on whether children are monolingual or bilingual. Unimodal bilinguals typically have lower formal language

proficiency than monolinguals, smaller vocabularies, and weaker and slower access to those lexical items that are in the repertoires. Bilinguals exhibit enhanced metalinguistic awareness in comparison with monolingual peers (Ben-Zeev, 1997; Cromdal, 1999; Galambos & Hakuta, 1988). All these areas have been found to be domains of particular difficulty for deaf children (Marschark, 1993; Marschark & Hauser, 2012). Bialystok and Craik (2010), however, suggested that the benefits of bilingualism in (hearing) children generalize beyond language to other aspects of cognition, supporting both verbal and nonverbal functioning (e.g., selectivity of attention and inhibition; Marschark & Hauser, 2012, chap. 6).

In the literacy domain, English–ASL bilingual deaf children of deaf parents, on average, do tend to surpass deaf children of hearing parents, but those differences tend to be small, and only rarely is the former group compared to hearing peers. As with children who have cochlear implants, grade-level reading achievement of deaf children of deaf parents has been demonstrated among children in elementary school (see Geers, 2002, with regard to children with implants; Chamberlain & Mayberry, 2000; Padden & Ramsey, 2000, with regard to deaf children of deaf parents). By high school and college age, however, students with implants (Archbold et al., 2008; Geers et al., 2008) or deaf parents (Convertino, Marschark, Sapere, Sarchet, & Zupan, 2009) no longer have a significant advantage. The students with implants in these studies, however, generally had unilateral implants and received them relatively late compared to current standards. It is not yet clear to what extent bilateral implants and implantation at 1 year of age contribute to achievement in the domain of literacy, but data of that sort cannot be far off.

Some of the results described above may reflect the fact that bilingual education necessarily involves competition in language input (Scheele, Leseman, & Mayo, 2010). A child who has to learn two or more languages has less input per language than a child who is learning only one language. Such competition can have a negative influence on learning a language, essentially akin to less time on task but potentially could be offset to some extent by interlanguage transfer. The likelihood of transfer eliminating negative effects of competition between spoken language and sign language among deaf children, however, is smaller than among hearing children learning two spoken languages. This is because natural sign languages do not have parallel writing systems, and thus, although they may be fully appropriate for educating deaf children, they are not equivalent to written/spoken languages.

Bilingual Education: Challenges for Deaf Children

Millions of children around the world grow up bilingually. It is simply a consequence of the situations in which they live, either a geographical area where two or more languages are spoken or a community with multiple languages due to immigration. Indeed, in our increasingly interconnected world, mastery of more than one language carries a variety of benefits. And, yet, bilingual education for deaf children continues to be a "hot button" for many people, even though (or perhaps because) there is no convincing evidence for or against it.

Deaf children of deaf parents who communicate in a natural sign language may have an advantage in becoming bilingual by acquiring the national written/spoken language compared to deaf children of hearing parents. Those children live in a relatively language-favorable situation for the acquisition of language compared to deaf children who do not share an effective mode of communication with their (hearing) parents. On average, the availability of fluent language models from birth results in their acquisition of written language appearing somewhat advanced compared to deaf children of hearing parents (e.g., Chamberlain & Mayberry, 2000). Still, their early acquisition of sign language is quantitatively and qualitatively different than the acquisition of spoken language by hearing children of hearing parents (Lederberg, Prezbindowski, & Spencer, 2000; Marschark & Woll, 2012), again reflecting the lack of exact equivalence in acquiring sign language or spoken language.

For deaf children in hearing families, parents have to make an explicit choice for bilingual education. If they make that choice, they also need to commit to learning a new (signed) language. Obviously, they will

not be able to provide a rich, fluent, and consistent language model immediately, making it difficult to compare the linguistic and cognitive implications of the multilingual situation of deaf children with that of hearing children who grow up bilingually (but see Hao, Su, & Chan, 2010). And offering consistent, rich language input by parents, whether in sign or in spoken language, seems to be a key factor in establishing reading proficiency in deaf students (Harris & Beech, 1998). Nevertheless, deaf children whose parents support early development through the use of signs appear to have linguistic, social, and academic advantages during the early years (Calderon & Greenberg, 1997). Early signed communication in the family and the ability as an adolescent to understand the parents, for example, are two predictors of sound mental health in deaf adolescents, both those with and without implants (Van Gent, Goedhart, Knoors, Westenberg, & Treffers, 2012). The long-term implications of early sign language for social–emotional, academic, and literacy in particular remain unclear. Studies of children in which sign language and early language are not confounded (e.g., deaf children of deaf parents) are needed, but at least by university age, sign language skills and age of sign language acquisition not predict classroom learning (Convertino et al., 2009).

Offering sign language and spoken language to deaf children admittedly also can lead to competition in the language input in terms of the overall amount of auditory input compared to deaf children who grow up exclusively with a spoken language. Contrary frequent assumptions, little is known about whether there is a critical amount of spoken language input needed for spoken language development among deaf children either with or without cochlear implants (Kuhl & Rivera-Gaxiola, 2008), and there is no published evidence that sign language interferes with spoken language for either group (Spencer & Marschark, 2010, chap. 5). Still, the context of raising and educating deaf children has changed considerably since the 1990s.

Interestingly, or perhaps just reflecting the times, the present authors did not know each other then, but both wrote in 1993 about the importance if not the necessity of deaf children becoming bilingual (Knoors, 1993; Marschark, 1993). Neither of us would dare make this claim this now, at least for deaf children who have been implanted early in life, even though we believe that bilingualism for deaf children (and adults) still holds considerable importance. Knoors (1993), partly based on his 1992 study of the acquisition of morphosyntactic sign language structures by deaf children with hearing parents (Knoors, 1992), argued that by far most deaf children acquired two languages but would become proficient in neither without bilingual education. Marschark (1993), in his review of the psychological literature, emphasized the importance of bilingual–bicultural models not only for educational/literacy purposes but for social and personality development as well. Today, both of us have strong inclinations that deaf children with hearing parents in bilingual settings are less proficient in sign language than we had expected or wished. Moreover, we are seeing a larger group of children becoming proficient in spoken language than either of us imagined in 1993.

In 1993, we both believed that the educational language policies in our countries had not yet adjusted to the fact that deaf children preferred and likely benefitted from communication in languages different than spoken Dutch and English. Within the educational settings in which we work—and beyond—we now both know many deaf children and older deaf students who have spoken language as their preferred mode of communication. Depending on the situation, many of those individuals support their speech with signs to a greater or lesser extent. Does this reflect the success of bilingualism for deaf children? Knoors (1993) considered the very limited access to spoken language as the core developmental and educational problem of deaf children, and Marschark (1993) assumed that only providing fluent access to a natural sign language would be sufficient to overcome challenges and those domains. Both of us now feel that the unavailability (impossibility?) of fluent language models from an early age for deaf children with hearing parents is at least a comparably large problem. One possible solution to this impasse is sign-supported speech (SSS) or simultaneous communication (SC), but this, too, remains a "hot button" item for many people.

SSS/SC, simultaneous use of spoken language accompanied by the signs of the indigenous sign language (but not the grammar), has long been criticized for not

being a true language (e.g., Cokely, 1990; Johnson, Liddell, & Erting, 1989; Marmor & Pettito, 1979). Nevertheless, although there is little evidence with regard to its viability in language development (Schick, 2011), the empirical evidence with regard to classroom learning has consistently indicated that deaf adolescents and young adults learn just as much from SSS/SC as they do from any other form of communication (e.g., Cokely, 1990; Marschark, Sapere, Convertino, Seewagen & Maltzen, 2004; Newell, 1978). In a meta-analysis of 10 experiments in which deaf university students in mainstream classrooms had received instruction from teachers utilizing sign language interpreters, Convertino et al. (2009) found that students' SSS/SC receptive skill was the only communication variable to predict learning, even though SSS/SC had not been used for instruction in any of the experiments. When other factors were controlled, students' receptive and expressive skills in ASL and English were unrelated to learning, as was the hearing status of their parents. Indeed, many deaf students today, both with and without cochlear implants, appear quite comfortable using spoken language and sign language together.

Meanwhile, it has become increasingly clear that manual gestures and signs could, at least in theory, have positive effects on spoken language processing and language learning in deaf individuals, providing a manual "backup code." Such effects seem especially likely if they have relatively good auditory access to speech, as do many early-implanted deaf children. So, why is it that SSS/SC bothers so many people? This is even more puzzling because we know that gestures accompanying spoken language not only facilitate its comprehension (Habets, Kita, Shao, Özyürek, & Hagoort, 2011; Kelly, Özyürek, & Maris, 2010) but also its production (Wagner Cook, Yip, & Goldin-Meadow, 2011), with symbolic gestures having the largest effect. Positive effects of such gestures also have been found in second language learning (e.g., Tellier, 2008). Although similar research into the effect of speech supporting signs is largely lacking, it is hard to see why these signs could not, at least in theory, have similar positive effects on language processing and language learning in deaf individuals, certainly if they have relatively good auditory access to speech as many early implanted deaf children have.

Bilingual Education: Outcomes

Bilingual education for deaf children has existed in a number of countries for 20 years or more. Initially, much attention was devoted to the implementation of such programming, and it is remarkable how few studies are available regarding related academic outcomes. In Sweden, which has had bilingual education for deaf children for over 25 years, it is only recently that national studies have reported related achievement data. Hendar (2009) and Rydberg, Gellerstedt, and Danermark (2009) reviewed educational outcomes among students currently enrolled in educational programs and others who already left school. Both studies reported only limited educational gain. Examining cohorts that went through school before and after the advent of bilingual deaf education, for example, Rydberg et al. found that deaf individuals in Sweden still lag significantly behind hearing peers despite having received all of their education bilingually. Why are there no published studies from other countries? Has the question of bilingual education efficacy not been asked, or has the research not yielded publishable answers (e.g., null results)?

We know somewhat more about the level of sign language skills among children receiving bilingual education than we do about their educational attainment. On average, the sign language skills of deaf children with hearing parents lag far behind the skills of deaf children with deaf parents (Hermans, Knoors, & Verhoeven, 2009; Mayer & Leigh, 2010; Spencer, 2004). It thus seems that for some reason we are unable to provide bilingual deaf education programming sufficient to give sign language fluency to the more than 95% of deaf children with hearing parents. It is not known whether this results from the lack of sign language proficiency among most hearing parents and teachers or from a lack of appropriate language instruction methods. But successful second language learning by adults (including learning a sign language by hearing parents) cannot be taken for granted. Although there certainly are proponents for the view that second language learning by adults can lead to native language fluency as long as language learning conditions are appropriate (e.g., Bialystok, 1997, 2002), the vast majority of empirical studies seem to indicate

that there are critical time windows for learning the full grammatical complexities of a second language (Johnson & Newport, 1989; Mayberry, 2010; Mayberry & Lock, 2003). It now appears that second language proficiency in adults is linked to analytical skills as well as part of language aptitude and that native or near-native fluency in adult learners is extremely exceptional (Abrahamson & Hyltenstam, 2008; DeKeyser, 2000). Women also are considerably better than men in learning a second language later in life, even if their native language proficiency is comparable to that of men (Payne & Lynn, 2011). Finally, a considerable proportion of adults have extreme difficulty learning a second language because of general learning difficulties, not because of difficulties specifically related to (first) language acquisition (Palladino & Ferrari, 2008). Sometimes a sign language offers better opportunities for the development of language, but evidence is accumulating that specific language impairment may also occur in deaf children acquiring sign language (Mason et al., 2010; Quinto-Pozos, Forber-Pratt, & Singleton, 2011).

It frequently appears that learning a sign language as a second language is more difficult for adults than learning a second spoken language, but the empirical case has not been made. It may simply be that signed languages give the impression of being more easily learned when, in fact, they are just as difficult as learning spoken languages (Peterson, 2009). Bochner, Christie, Hauser, and Searls (2011), however, on the basis of an empirical study into the discrimination of linguistic contrasts in ASL by native signers and by late hearing learners, predict that L2 learners of signed languages, especially adult learners, will face a formidable challenge in acquiring the phonology of the signed language in situations in which their L1 is a spoken language. In addition, unlike deaf children who may be exposed to sign language throughout the school day, the time that is invested in learning sign language by hearing adults necessarily will be relatively limited. The possibility of frequently being engaged in conversations with other (fluent) sign language users also is considerably more limited than is the case for many spoken languages because of the relatively limited number of sign language users. From Dutch research for standardization of the Test on Sign Language of the Netherlands (Hermans, Knoors, & Verhoeven, 2007, 2009), we know that only 9.8% of the hearing parents of over 300 deaf children in the study communicated with their deaf children exclusively in SLN. Another 18.9% used exclusively spoken Dutch, and 20.9% used spoken Dutch supported with signs. Overall, 31.5% of all families with a deaf child used a combination of SLN, Dutch with sign support, and spoken Dutch. In the United States, data on language use are available from the Annual Survey of Deaf and Hard-of-Hearing Children and Youth, generally assumed to cover perhaps 65% of deaf and hard-of-hearing children, with the greatest underreporting likely among singletons in regular classrooms (and thus more likely to use spoken language); 2009–2010 data indicate that "family members regularly sign" in only 23% of the families of those children. English was reported to be used in 82.3% of the homes (21.9% report using Spanish), whereas only 5.8% report using ASL (GRI, 2011).

The lower than expected sign language proficiency among deaf children with hearing parents, in the end, will express itself primarily in problems of comprehension and production of more grammatically complex sign language structures, particularly important to CALP. Mayberry and Lock (2003) have shown that such disfluencies are relatively permanent and have a negative impact on the acquisition of a second language. Such findings indicate the necessity of establishing a rich language input for deaf children before the age of 3 years and preferably from birth. Accordingly, research consistently indicates that early cochlear implantation results in improved reading comprehension for most deaf children, presumably because of their greater access to spoken language (see below). Thus far, however, it has not been shown that bilingual deaf education (with children with or without cochlear implants) leads to comparable results. In what appears to be the only publicly available report documenting academic outcomes from bilingual education in the United States, Nover, Andrews, Baker, Everhart, and Bradford (2002) provided reading comprehension scores from one such program. They reported that among deaf children aged 8–12 years, over one third of whom had deaf parents, Stanford Achievement Test Reading Comprehension test scores were significantly above the national norms (medians) for deaf children

reported by Traxler (2000). Yet the the results of Nover et al. show only modest differences of about 5–25 points (<1%) at different ages across the 5 years. Marschark (2011) summarized data from one arbitrarily selected school that primarily uses SSS/SC, finding scores 5–40 points above the national medians across the same age range and in the same years. Those children scored at or above the children in the study by Nover et al. at all ages but one (9 years).

If bilingual education per se has not been demonstrated to improve educational outcomes, it has been shown that there is a positive correlation between sign language skills and reading proficiency for deaf children (Chamberlain & Mayberry, 2000), just as there is between the spoken language skills and reading proficiency both younger and older deaf students (Lichtenstein, 1998; Waters & Doehring, 1990; but see Mayberry, Giudice, & Lieberman, 2011, for limitations). Children with better sign language skills do read better, and children who read better have enhanced sign language skills (Hermans, Knoors, Ormel, & Verhoeven, 2008). In particular, sign language provides some benefit to deaf children during the first years of reading instruction, apparently through the building up a reading vocabulary. After a period of growth, however, stagnation occurs, and the reading skills tend to lag or asymptote among deaf children both with and without cochlear implants (Archbold et al., 2008; Geers, Tobey, Moog, & Brenner, 2008; Traxler, 2000). Hermans, Knoors, Ormel, and Verhoeven (2008) argued that the original growth occurs as deaf children link signs and written words, a process that is later supported by teachers demonstrating similar connections for them. It is as if they read by creating a detour to their sign language. In later stages of reading development, this avenue is no longer effective, and they then have to learn to actually read in the language of the text (Mayer, 2010). Their skills in written/spoken language often are insufficient at this point (Hermans et al., 2008). Among deaf 12- to 22-year-olds, Marschark and colleagues (Marschark et al., 2006, 2009) found that learning from text was equal to or better than learning from sign language, from deaf or hearing teachers, even among those students who had used sign language throughout their school careers.

If explicitly making connections between signs and written words supports transfer between sign language and written language, it appears to do so only when deaf children are a bit older, around the age of 8 years. It is at that age that a positive correlation emerges between sign vocabulary and reading vocabulary (Hermans, Ormel, & Knoors, 2010). Deaf children with hearing parents may have insufficient sign language skills at a younger age to profit from the didactical strategies of their teachers. Alternatively, at a cognitive level, they may be less likely than deaf children of deaf parents or hearing children to spontaneously engage in the kinds of associative, relational processing that supports learning across a variety of verbal and nonverbal domains (Marschark & Hauser, 2012, chap. 8; Marschark & Woll, 2012). A targeted application of signs in training programs for spoken (Mollink, Hermans, & Knoors, 2008) and written language (Wauters, Knoors, Vervloed, & Aarnoutse, 2001) has been shown to be effective for deaf children acquiring Dutch, although the linguistic and cognitive foundations of such training remain to be explored. In any case, not only do hard-of-hearing and deaf children learn more words by the application of signs combined with spoken or written words, they also remember the words better. Moreover, when signs support spoken words, they do not hinder the auditory speech perception in children with cochlear implants. On the contrary, in both the perception of specific words (Giezen, 2011) and in reading comprehension (Spencer, Gantz, & Knutson, 2004) those children appear to benefit from the availability of bimodal input.

In an overview of theory and research relating to bilingual education and literacy, Mayer and Leigh (2010) concluded that, at present, there are no empirical results to support the assumption that children in bilingual deaf education programs become as proficient in either language or literacy as their hearing peers. Spencer and Marschark (2010) similarly concluded that bilingual deaf education may have a strong theoretical foundation, but thus far, there is not enough evidence to actually make claims about its effects. Admittedly, when implementation of bilingual programming for deaf children began—it was never an evidence-based practice with regard to that population—many people expected this, but we hoped for more.

Newborn Hearing Screening and Cochlear Implants: An Unexpected Perspective

In roughly the same period that bilingual deaf education has been introduced in a number of countries, there have also been major breakthroughs concerning the introduction of newborn hearing screening and cochlear implantation. Newborn hearing screening was introduced in the Netherlands between 2000 and 2005, and U.S. states and developing nations are increasingly doing so as well (Leigh, Newall, & Newall, 2010). Depending on the health care system, the hearing of newborns may be tested while still in the birthing hospital or within a few weeks after birth. This results in identification of hearing loss within the first months of life, allowing intervention to start much earlier than is the case when hearing is screened at the age of 9 months (previously in the Netherlands) or during the primary school years (previously in the United States). One such intervention is the provision of a cochlear implant. Newborn hearing screening has led to an enormous increase of the number of children receiving cochlear implants and their receiving them at an earlier age, both factors contributing to improvements in hearing and speech (e.g., Dettman & Dowell, 2010; Hammer, 2010; Verbist, 2010).

A positive impact of early screening and cochlear implantation has also been well established with regard to reading skills (Archbold et al., 2008; Marschark, Sarchet, Rhoten, & Zupan, 2010; van der Kant, Vermeulen, de Raeve, & Schreuder, 2010; Vermeulen, van Bon, Schreuder, Knoors, & Snik, 2007). Once again, although generally facilitative, there are considerable individual differences in these effects across children (Fagan, Pisoni, Horn, and Dillon, 2007; Pisoni et al., 2008). Even among younger children, those who show the greatest benefits in reading from cochlear implants, there is considerable unexplained variability in outcomes, separate from the diminution of effects at later ages (e.g., Geers et al., 2008). Harris and Terletski (2011), for example, found that a sample of deaf youngsters who had received their cochlear implants before the age of 3.6 years did not read as well as deaf peers with hearing aids. Neither age of identification nor hearing thresholds predicted reading levels. However, there was a confound with regard to educational placement, as the majority of children with hearing aids attended special schools for deaf children whereas those with cochlear implants were more likely to be enrolled in mainstream classrooms or special units within mainstream schools. Specifically, the students in the special units showed severe reading comprehension difficulties. Whether this situation reflects unexpected differences in the schools (i.e., special schools providing better reading instruction) or unexpected differences in the children (e.g., those with hearing aids having more functional hearing, greater cognitive abilities, or more parental support) remains to be determined (see Marschark et al., 2010 and Fagan et al., 2007, for likely contributing factors).

Bilingual Language Policies and Preferences Revisited

In view of the foregoing developments relating to identifying and ameliorating children's hearing losses, there unavoidably have been changes in language policy in deaf education. These have been happening incrementally and often subtly. We simply are advocating that they become more explicit and evidence based. In short, we believe that language policy for deaf children will have to be shaped further, into a differentiated form. Just as education advocates for deaf children argue against a "one-size-fits-all" approach to school placement, a similar approach to language planning and policy is at best out of date and at worst discriminatory. In particular, it is important to realize that there has been considerable change in the number of children using cochlear implants and the age they have been implanted in relation to their stage of education. For example, although exact numbers are not available, it does not seem unreasonable to assume that in the Netherlands over 90% of all deaf children up to 5 years old receive cochlear implants before they were 2 years old. These children have the most favorable opportunity for the acquisition of spoken language. Between the ages of 5- and 12-years old, the percentage of implanted children appears to be somewhere between 50% and 60%, with an average age of implantation at 3–4 years. There will be many more children in this group that have less favorable prognoses for the

acquisition of spoken language. In secondary education, the percentage of students who received cochlear implants at an early age appears to be no more than 20%. This is the group of pupils that mostly resembles the group of deaf children for whom bilingual deaf education in the Netherlands was set up in the 1990s. In our opinion, language planning and language policy for these three groups cannot be identical.

A change in language policy is most obviously necessary for deaf babies who are now being implanted, the present group of toddlers and preschoolers, and to some extent for students in primary school. These groups form the focal point of the remainder of our discussion. Meanwhile, bilingual education, with a natural sign language as the language of instruction, still seems most preferable for many deaf students in secondary and postsecondary education, and we believe there is sufficient empirical evidence to support that view (e.g., Marschark, Sapere, Convertino, & Pelz, 2008).

Among the changes in language planning we are advocating is the transformation and the improvement of sign language input provided in the family and in the educational setting. Transformation seems an appropriate term for the changes that will be necessary for the large group of deaf children who receive cochlear implants very early, children for whom the parents are not likely to choose a bilingual upbringing and education. In the Netherlands, Sweden, and some other countries, this change would require a change in educational policy. In the United States and other countries, it would require a change in the way that those involved in educating and advocating for deaf children view the role of language in their lives. In either case, we should start with acceptance of the fact that many younger deaf children have greater opportunities to acquire a spoken language than ever before and that spoken language will be the first language for many of them. Communication between parents and child, in particular, will mostly occur in spoken language. At the same time, we believe it is still worthwhile to encourage parents to learn and use sign language regularly, especially as a support to the spoken language. Signs will support the auditory perception of speech, contribute to language comprehension, and, as we indicated earlier, add to an already improved spoken language vocabulary. Prior to cochlear implantation at about 1 year of age, the need for visual communication also needs to be addressed. Not only will sign language provide early identified deaf children with access to the fundamentals of language prior to implantation, but learning to perceive spoken language after implantation takes time and sign language can serve as an effective bridge, perhaps with as yet unexplored long-term benefits.

Sign language together with spoken language (simultaneously or not) offers deaf children the opportunity for continuous exposure to language from the point of hearing loss identification, thus reducing the possibility of communication being compromised and missed opportunities for learning. Even after a child receives and perceives with an implant, some proportion of auditory information is still missed due to background noise, temporary equipment malfunction, or dead batteries. And, of course, when the implant is removed, the child is quite deaf. We believe that SSS/SC can support comprehension and auditory learning in such situations, providing children with greater cloze opportunities and facilitating rather than hindering the acquisition of spoken language. Given the lack of evidence against the use of SSS/SC, except for the finding that those who do not use it well do not use it well (Marmor & Pettito, 1979), there does not appear to be any pedagogical, audiological, or linguistic reason to advise parents against it. Rather, it would be wise to instruct parents in the basic principles of sign language grammar as well, for an easier combination of speech and signs.

Mohay, Milton, Hindmarsh, and Ganley (1998) argued that instructing parents in visual communication also would encourage a more open attitude toward deaf children, deaf adults, and the Deaf community. A similar argument could be made with regard to family-centered support and education. Family counselors, early interventionists, pedagogical staff, and teachers who communicate with deaf children using spoken language can support communication through the use of accurate SSS/SC. The use of SSS/SC will be particularly important when the child is very young, when there is more background noise, or when the educational task is very demanding for the child on cognitive and linguistic levels. "Accurate use of SSS/SC" entails that the speech remains fluent while

the content of the expression is being effectively expressed in conceptually appropriate signs. This can only be done when sign language principles (e.g., use of location, indexing, and appropriate handshapes) are applied in the use of signs, when parents and professionals are trained intensively in the use of SSS/SC, and their language use is conscientiously supported through mentoring and tutoring.

In the end, many of deaf children who receive cochlear implants early will communicate exclusively in spoken language, inside and outside the school. They will reduce their reliance on signs naturally, without deliberation, while also using them in situations where it is needed (Watson, Archbold, and Nikolopoulos, 2006). This code switching is already evident among deaf students with cochlear implants, most notably at implant centers that support the use of sign language as described above but also in both school and social settings. At least in the United States, we also are seeing deaf students transferring from regular schools into special schools for the deaf, typically at the secondary level, seeking similar peers and cultural identification. Although the frequency of this phenomenon has not been documented, it is happening often enough to indicate that there will be a significant proportion of deaf children raised with spoken language who later will seek out sign language as part of their identity.

In suggesting the above changes, we recognize that audiologists and other professionals who have been trained to support individuals who want to rely fully on speech and hearing may find this paradigm shift disconcerting or even inappropriate. We therefore suggest explicitly teaching and perhaps demonstrating to deaf students that they do sometimes miss information in spoken language thus emphasizing the need for self-advocacy. Indeed, research has shown that they frequently are not aware of communication breakdowns and missed communication themselves, and they tend to overestimate their comprehension of both spoken language and sign language (e.g., Jeanes, Nienhuys, & Rickards, 2000; Marschark et al., 2007).

Trying to force children to use signs clearly makes no sense at all. For this large group of children, we can imagine sign language as a recommended second language, accepted as such with academic credit as it is now in some countries. Offering sign language as a school subject for deaf children in regular education as well as those in special education contexts will generally improve the level of sign language skill among deaf children. For most of them today, we explicitly teach them (and hearing peers) their national written/spoken language, but sign language usually is something that they have to "pick up along the way." This situation not only results in uneven language skills but creates significant difficulties for teachers of deaf students who are likely to have students at widely differing language levels, frequently learning language at the same time as they are supposed to be learning content (Marschark & Hauser, 2012, chap. 11).

Next, we should consider the introduction of sign language in continuing education for "orally" educated deaf adolescents and adults. From the work of van Hell and colleagues (e.g., van Hell, 2010), we know that effective foreign language education needs to meet strict conditions. One of them is that teachers are fluent users of the language. Teaching sign language as a second language (SL2) requires teachers who are native or near-native signers and have also received teacher training. SL2 curricula for adults already have been developed in the United States and other countries that also have professional certification for sign language instructors. Simply being a native signer or an interpreter is not sufficient to make someone an appropriate sign language instructor anymore than being a native speaker of a spoken language qualifies one to teach it (Monikowski & Winston, 2011).

In between the above two groups, will be deaf children for whom an upbringing and education in two languages will be most appropriate because their deaf or hearing parents wish it, because they have not received cochlear implants, or because implants offer them only limited opportunities for acquiring a spoken language. The latter situation can arise from neuropsychological, cognitive, or motor correlates of deaf children's hearing losses (Pisoni et al., 2008) or because of specific language disorder in addition to their hearing loss (Hawker et al., 2008; Mason et al., 2010; Quinto-Pozos et al., 2011). In any case, it is of greatest importance (and a huge challenge) to develop diagnostic procedures that identify these children as soon as possible and at the youngest possible age, preferably before the age of 2 years (Mayer & Leigh, 2010).

Assessing working memory in infants and toddlers (Noland, Reznick, Stone, Walden, & Sheridan, 2010), possibly supported by ERP measurements (Bell, 2012), might prove a fruitful direction to explore. Alternatively, studying nonword repetition (Coady & Evans, 2008) and non-sign repetition (Mann & Marshall, 2010; Marshall, Mann, & Morgan, 2011) in young implanted deaf children might be an equally promising avenue to exploit. In this way, parents can be advised when spoken language is less likely to be successful and offer them the opportunity to provide their children with rich early language input through sign language.

For the children for whom bilingual upbringing and bilingual education is appropriate, improvement is needed. Most centrally, these children need to be provided with greater chances to become truly fluent in sign language, the first condition for a possible transfer of skills from sign language to written/spoken language. Early in life, environments should be created for these children so that they have the opportunity for the input of both spoken language and sign language from fluent models. Such an environment presumes intensive sign language classes for parents in order to make their signed input as rich and accurate as possible, and video-based, in-home training to further support effective communication and acquisition of BICS at home. A bilingual environment of this sort also presumes the availability of professionals, beginning with family counselors are interventionists and later involving teachers, who are sufficiently skilled in sign language that they can not only educate but also teach in this language. A sign language proficiency at the level currently required for certification as a teacher or interpreter of sign language seems the minimal requirement to us (see Monikowski & Winston, 2011). Finally, the kind of bilingual environment we are advocating requires a sufficient number of younger and older deaf children who also can communicate in sign language and, preferably, in both sign language and spoken language. Such an environment, and the kind of improved bilingual option we are advocating is available only in a limited number of settings that we are aware of (in several countries), generally referred to as co-enrollment programs (see Knoors & Hermans, 2010; Spencer & Marschark, 2010, chap. 9).

Looking Forward

We believe that the major consequence of revisiting bilingual language planning and policies is that differentiation in language input will occur for deaf children, as well in family support. Forms of differentiation have been introduced in recent years in various schools for the deaf, varying from differentiation in classrooms, differentiation between class groups (flow models), or differentiation through the creation of adjacent educational provisions (twin or partnership schools). Differentiation still is controversial, especially to some who hold the opinion that even in this era, all deaf children should be brought up and educated bilingually from an early age. For us, this does no longer seems realistic, and for an increasingly large group of young deaf children no longer strictly essential. After all, the times they are a-changing. A carefully implemented, differentiated language policy will better meet the current wishes, strengths, and needs of deaf children and their parents. This is not like the 1950s and 1960s when deaf children were often placed in separate educational settings and when some parents and educators feared they would be infected with signs. That fear has been proven to be totally unjustified. Sign language stimulates the development of deaf children in a number of ways, and there is no evidence of any negative effects. By applying a nuanced distinction in language input, by maintaining interaction between deaf and hard-of-hearing children in and across educational settings, by establishing a good educational program in SLN2, and by precisely measuring and monitoring the cognitive and social–emotional outcomes of coaching and education we can do even better, more appropriately matching the needs and strengths of deaf children. To accomplish these goals, however, we need a continuing adjustment of language planning and policies so that they serve us and not us them.

Conflict of Interest

No conflicts of interest were reported.

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