

THE BENEFITS OF SIGN LANGUAGE FOR DEAF CHILDREN WITH AND WITHOUT COCHLEAR IMPLANT(S)

Krammer Klaudia, MA

Alpen-Adria-Universität Klagenfurt,
Center for Sign Language and Deaf Communication, Austria

Abstract

Prelingual deaf children do not have sufficient access to sound to be able to acquire a spoken language via the acoustic channel. The same is true of many deaf children who received one or two cochlear implants: Only a small segment of these children profit from the implant(s) in such a way that they can acquire spoken language naturally. For most children the implants are improving the access to sound but not sufficiently to be able to reach a normal language competence. In order to give these children the possibility to develop a functioning communication system and to guarantee normal development they need a language which is totally accessible to them - a sign language.

The consequences of language deprivation for the development of a child are known from developmental psychology. To avoid this, sign language from the very beginning offers a deaf child the possibility to communicate at any stage in life and guarantees thus a normal development. Using a sign language does not mean the exclusion of a spoken language and vice versa; the use of a sign language and the development of spoken/written language should happen in parallel. What is crucial is that each child should have the possibility to communicate according to its needs and thus has the chance of a normal development.

Keywords: Deaf, Sign Language, Bilingual Education, Cochlear Implant

Introduction

Prelingual deaf children cannot hear spoken languages well enough to learn them via the acoustic channel. For these children acoustic information is not accessible and therefore all acoustic data has to be presented in a visual form. As a consequence they need a special form of bilingual education, where a sign language provides the linguistic and cognitive base and a national written/spoken language is 'anchored' to the first system as a second language.

Regarding children with a Cochlear Implant (CI) it is a fact that a CI does not automatically enable all implanted children to pass through a natural spoken language acquisition process – regardless of whether the child has a uni- or bilateral CI. Compared to hearing children, implanted children show a relatively large range of hearing, articulating and language abilities. For these children sign language can be a kind of “insurance policy” in case that the spoken language abilities do not develop sufficiently.

Many experts advise parents not to use sign language with their deaf child (with or without CI) and give various arguments against its use. In this article the most common arguments are evaluated for their relevance and it will be shown that they can be invalidated.

Sign language

For many deaf, hearing-impaired as well as hearing people, sign language (SL) is their preferred language or mother tongue. Sign languages are languages with their own

structure, grammar and rules. Nowadays they are recognised as first language of the deaf in many countries (see Krausneker 2006). Consequently, it is a language which can be used by people to communicate with each other, in the same way like e.g. German. For children with a CI it is often strongly recommended to use spoken language only and not spoken and sign language simultaneously. Nobody would deny a child who grows up in a bilingual (spoken) environment like German and English to speak e.g. the German language. Quite the opposite is true: As is known from the research in bilingualism, bilingual children profit from their bilingual environment in every respect. This positive attitude towards bilingualism (sign and spoken/written language) is often non-existent with respect to deaf children - with or without a CI.

Cochlear Implants

Until recently a unilateral CI was seen as standard treatment for infants and children who have a prelingual high-degree hearing impairment or who are almost deaf. The linguistic abilities of these children vary a lot and do not meet the expectations: only a small number achieve the articulating abilities and the language understanding of their hearing peers and are able to pass through normal language acquisition; compare Szagun 2001; 2010; Nussbaum et al 2003; Szagun et al. 2006; Moret et al. 2007;

Since the language competence expectations of unilateral implanted children were not met, it was assumed that two implants might guarantee better results. The basic idea of this assumption is that normal hearing is binaural and hence two CIs should ensure better results (Berke 2010). In fact, better results can be observed, but only in the areas of sound localization and speech recognition in noisy environments, although compared to hearing peers these results are still poor. Regarding language acquisition and competence no striking improvement - also compared to unilateral implanted children - can be observed (Krammer 2013). Both bilateral implanted children and unilateral implanted children show a far greater variability in their speech tests results than normal hearing children. The reasons are still unknown (Forli et al. 2011; Wilson & Dorman 2008). In the literature many hypotheses can be found about which factors might influence the language acquisition positively or negatively (compare Spencer 2004; Szagun 2001). However these often contradictory hypotheses show that there are still many unanswered questions in this field.

These studies and also practical experiences from schools (Nussbaum et al. 2003) make clear that there can be no “standard treatment“ of Cochlear implanted children. Different offers are needed which have to be adapted to the individual needs of these children.

Pros and cons concerning some central statements referring to bilingualism

“Sign languages are natural languages”

As Dotter (1991) shows the most common arguments against this statement are the following: Sign languages are not languages from a linguistic perspective, i.e. they are denied the “character of a system with distinctive elements”. Sign languages, it is argued, are missing important features of a language (e.g. arbitrariness, morphology) and they are not as effective and versatile as spoken languages.

Linguistic research proves that sign languages have linguistic status (Boyes Braem 1990; Dotter 1991): Sign languages are natural languages with complex structures and an independent grammar (Stokoe 1960; Emmorey 2002; Skant et al. 2002), as well as a sub-lexically (“phonologically”) significant sequential structure (Liddell & Johnson 1989). This means that, like spoken languages, sign languages have sub-lexical elements (phonology), morphology, semantics, syntax and pragmatics, and the lexicon consists of iconic and

arbitrary signs. Moreover, sign languages may be used to convey complex and abstract contents - just as spoken languages.

On the basis of these scientific arguments there are no doubts whatsoever that sign languages are independent, visually perceivable languages which are as effective as spoken languages.

“Sign variants are no problem for learning a sign language”

Sign languages have national and regional variants: This is, the reasoning goes, why sign languages are not suitable for communication. The regional variants will lead to problems of understanding (Ribitsch 2002).

Looking at spoken languages, it becomes obvious that there is no difference to sign languages regarding variation: there are various national spoken languages (e.g. English, German) and all of them have several regional variants (e.g. Scottish, Irish). From this perspective, the argument against using a sign language is no longer valid.

The following variants in a sign language are examples from the Austrian Sign Language: There are standardized signs (ÖGS – which corresponds to a national spoken language) and regionally differing sign variants. As in spoken languages these can be distinct lexemes (example 1) or articulatory variants (example 2)

Example 1: Distinct lexemes of the sign BAUER (“peasant, farmer”)



ÖGS Sign



Sign used in Carinthia



Sign used in Vorarlberg

Example 2: Differing “articulation” of the sign ABEND (“evening”)



ÖGS sign



Sign used in Vienna



Sign used in Vorarlberg

“Sign language allows a normal development”

Another argument is that if a sign language is used with a child, there is the danger of a retarded or not normal development. Since sign languages are considered not fully effective languages (cf. 2.1.) they cannot fulfil the manifold functions of spoken languages. For a normal development, the spoken language¹⁹⁹ is a decisive factor; it is essential for the cognitive, social and emotional development of a child.

Sign languages are visual languages, which – in contrast to spoken languages – are fully accessible by a deaf child²⁰⁰. If communication is exclusively performed in spoken language, a major part of the acoustic information cannot be perceived by the deaf child and consequently cannot be cognitively processed. Information which does not reach the child is information missing in his/the development. The first two years are crucial for the general development of a child: during this time communication/language plays an important role in the learning process. If this time frame, when the child is especially receptive to learning in general and to learn a language system in particular, is not used, various cognitive as well as language limitations will be the consequence (Dotter 1995). Thus, what happens if only a spoken language is used is exactly what should be prevented: the general development of the child is at risk.

“Sign language does not have a negative effect on the spoken language development”

It is often recommended to parents of a deaf child to communicate with it from the beginning only in spoken language. This recommendation is also given to parents whose child is a potential candidate for an implantation²⁰¹. The use of a sign language, it is argued, hinders or prevents the normal development of the spoken language (see Nussbaum et al. 2003).

Upon closer examination it can be seen that also in this case the use of a sign language has the opposite effect, i.e. it promotes the acquisition of the spoken/written language for both children with and without CI. Since there is a functioning communicative system, the child can be supported through the use of the sign language in learning the spoken/written language; the learning process is facilitated that way.

Problems with the acquisition of the spoken language by CI-implanted children may have different reasons:

- The CI does not work sufficiently well
The hearing impairment after the implantation is still too severe so that spoken language cannot be acquired naturally. In order to disguise this fact, often other factors are blamed like e.g. missing support by the parents, missing positive social environment, missing “talent for languages”²⁰² (Lenhardt 1997; Bertram 1997) or the sign language.
- Grammatical markers that are difficult to hear and words with secondary accent
Szagun (2001) noticed delays in the acquisition of article markers (case and gender) in CI-implanted children in Germany. These delays are due to the limited hearing ability of the children despite the CI: other than the stressed grammatical markers on verbs in the form of suffixes, the article markers are not stressed and are grammatical markers which are difficult to perceive. This is the reason why they are often missed or not acoustically perceived by the

¹⁹⁹ Until recently, the specialised literature on the cognitive, psychological, social and emotional development of a child has almost exclusively dealt with spoken language; a hearing impairment still is not regarded as an independent factor for the cognitive-linguistic ontogenesis (Dotter 2009). The premise is usually “language = spoken language”.

²⁰⁰ Exception: deaf children with a severe visual impairment; here the sign language has to be transferred to the tactile channel.

²⁰¹ Information given in personal communication with parents of deaf children (with and without CI) to the author.

²⁰² Lenhardt does not (1997) define “talent for languages”?

children. Therefore a delayed acquisition of article and similar markers can be observed in CI-implanted children.

- Acquisition of two languages

Research of spoken language bilingualism has shown that certain phenomena occur if two languages are acquired simultaneously (Bhatia & Ritchie 2007). With spoken language bilingualism, code switching, code mixing and borrowing of words²⁰³ are normal “side effects” in the process of acquisition (Bhatia & Ritchie 2007; Werker & Beyers-Heinlein 2008). The same phenomena occur in the simultaneous acquisition of a sign and a spoken language (Emmorey et al 2008). But, although these are normal cognitive processes when acquiring two languages simultaneously and not the “negative” influence of the sign language, sign language opponents attribute these “mistakes” to the use of sign language and therefore recommend not to use it.

“Children want to learn sign language”

“It is not necessary to offer the sign language. It is a fact that no single CI-implanted child wants to learn the sign language.” (Baumgartner 2007)

How can a deaf child (with or without CI) decide whether or not it wants to learn sign language, if it is not even given the choice? A child, hearing or deaf, will learn the language(s) which is (are) offered to it. Children are anxious and able to learn and – as is known from the research in bilingualism – learn two languages simultaneously without any problems as long as certain rules are observed. As is also known from the research in spoken language bilingualism, bilingual children profit from their bilingualism in several respects (Kern 2006): they have a higher awareness of language and a higher communicative sensitivity; they do better in tests on spatial perception, in verbal and non-verbal IQ tests and in tests of mathematics than their monolingual peers. Finally, these children are more flexible and open in socio-cultural and behavioural respects. Similar positive effects can be observed with bilingual children of a sign and spoken language (Krausneker 2004).

“The acquisition of a sign language in a bilingual context is possible”

An argument often put forward against the use of the sign language is the time which is needed by the parents to learn the language. Everybody who has already learned a second language knows that it takes at least two years until one has built up a relatively high language competence. The same holds for a sign language. For children with CI one has to take into consideration, however, that the implantation/rehabilitation of a child is also a considerable additional expenditure of time for the parents²⁰⁴. If one compares the year-long intensive care and support of CI-implanted children by their parents before, during and after the operation with the expenditure of time needed to learn a sign language, the acquisition of a sign language in a bilingual context is not more time-consuming, but has many advantages for the development and the future of the child (cf. arguments above and Krausneker 2004).

Sign language as “insurance”

Especially for CI-children, sign language can be seen as an “insurance”. Not all CI-implanted children (uni- or bilateral) are able to communicate exclusively in spoken language

²⁰³ Code switching is a change between the two languages. The discourse, sentence, phrase and word level may be affected. The reason for code mixing (the use of single language elements in the context of the other language; is considered a sub-category of code switching) is not that they have not fully mastered the two languages, but is due to system factors (Werker & Byers-Heinlein 2008). The borrowing of words is to be attributed to the fact that the bilingual speaker does not have the adequate vocabulary in the target language and thus refers to the vocabulary of L1 or L2 (see e.g. Werker & Byers-Heinlein 2008).

²⁰⁴ The rehabilitation phase may take up to five years and beyond that the child needs additional support (cf. <http://www.hoer-sprachfoerderung.de/cic/Rehazeitraum.php>)

after their implantation. Many of them do not achieve a satisfying language competence and comprehensible articulation (Kurschatke 2001, 2001a; Szagun et al 2006; Krammer 2008; 2013). As a result, they do not have an adequate linguistic system. For CI-implanted children who have communicated in sign language from their infancy the situation is different: These children are able to adapt the linguistic mode to the situation. If the spoken language capabilities of the child are developing ideally, its use of sign language may decrease with the rising competence in spoken language. If the child is not able to communicate sufficiently in spoken language, it may fall back on an already functioning system, the sign language. Another important reason for learning a sign language is that early-implanted children later in their lives often decide to live as if they were deaf (Dillier & Spillmann 1997).

“Sign language does not isolate”

Another argument against using sign language is the low acceptance of the language or the isolation of people linked with it. A sign language is used and understood by rather few people, i.e. sign language users move in a small, closed communication environment²⁰⁵ and due to the CI, this group is continuously becoming smaller (Kral 2009). Integration “with the outside” is difficult and the sign language community finally remains isolated.

It is true that sign languages still do not have the same status in politics and in public as spoken languages do. In Austria there has been a slow but continuous progress in sign language recognition in the last years. However, with the current (socio-politic) conditions, a full integration of the deaf and their language into the “culture of hearing people” is difficult. In general it has nothing to do with the sign language itself, but rather with the prejudices of many hearing people towards deaf people and sign language. It is also true that the deaf are a (stigmatised) minority within the hearing majority and like all minorities they are exposed to certain isolation.

In case of the deaf, however, there are differences with regard to the degree of their isolation:

If they have only the spoken language for communication, there is the danger of almost total social isolation. Knowledge of the spoken language is not sufficient to be able to fully participate in the social life of the hearing world. On the other hand they are not included in the deaf community either, because they cannot sign/communicate with other sign language users. These deaf people find themselves in a rather unpleasant situation: Due to their insufficient communication abilities in spoken as well as sign language they are (more or less) excluded from both the hearing and the deaf community. This way they drift more and more towards social isolation which – in the long run – has far-reaching consequences for their mental, psychological and physical health.

In contrast, deaf people who have grown up with a sign language as their preferred language or mother tongue are integrated in the deaf community, where they have intensive social contacts. Naturally, the social contacts with the hearing majority will always be more limited than those with people who use sign language. But through the early acquisition of written language, using their spoken language articulation abilities if needed, the services of a relay centre²⁰⁶ and/or the use of an interpreter, deaf people are not excluded from their hearing environment. For people who have little or no knowledge about deafness, this group of people may seem isolated. However, if one compares sign language users to people who have to make do with their low (spoken) language abilities, the former are far less isolated

²⁰⁵ Users of sign language are not a small, isolated group: In the German speaking countries (Austria, Germany, Switzerland) there are approximately 250.000 people using sign language (native signers and second language users). As with the spoken languages in these countries, there are national/regional sign language variants; still – as with the national variants of the German languages – communication across borders is possible.

²⁰⁶ A telephone exchange for deaf, hearing- and speaking-impaired people (Hilzensauer et al. 2005).

then the latter, who are almost completely excluded from either community. Seen from this perspective, the term “social isolation” has to be put into perspective.

Again, the opposite from what has been said about using a sign language is true: It does not lead to isolation but rather prevents isolation by improved integration into the respective communities.

The basis: linguistic input in the first 24 months of life

It is obvious from the arguments stated so far that linguistic input is important for the development of the child during the first 24 months of life. There are important milestones in terms of language development during the first year, which are the basis for the following (linguistic) development. This is true for spoken languages (Clark 2004; Gervain & Mehler 2009; Kral 2009) as well as for sign languages. Whether the linguistic input is spoken, signed or bilingual does not have any relevance to language processing and cognitive development; it is independent from the language mode (Campbell et al 2007; Szagun et al. 2006). Dotter (2009: 37) defines two criteria for a natural language acquisition of deaf children:

If one abandons the ideology that “the language” has to be a spoken one, general factors for a natural language acquisition may be analysed and respective compensation strategies for deaf children may be developed:

- *A language which can be acquired by the child has to be perceptible for it and possible to be produced by it without any problem.*
- *The time of exposition to this language should possibly be the same as the normal time of exposition available by hearing children in the acquisition of a spoken language.*

Therefore, it does not make sense to communicate with a prelingually deaf child only in spoken language. It is useful to offer these children a language as first language which is sensorially accessible to them, in this case sign language. In this way an early linguistic input is ensured and delay in the linguistic and overall development is prevented. The use of sign language does not mean that the spoken language should be avoided. On the contrary: The acquisition of the spoken language should run in parallel and according to the child's possibilities. What is important is that a language competence is built up in the language which is physiologically/sensorially most accessible to the child in order to avoid language deprivation and the negative consequences this implies for the child.

Conclusion

The arguments against the use of a sign language in the bilingual context with prelingually severely hearing-impaired and deaf children who are scheduled to get a CI or already have one are untenable. Since a pre-operative prognosis about the linguistic success with a CI is not possible, these children need optimal linguistic assistance and support already before the implantation. It is not a contest between different methodological approaches. The goal should be to combine these methods for the benefit of the children. The relevance of using sign language and bilingual education for the general development of children has been proved in cognitive and linguistic research as well as in developmental psychology studies.

References:

- Baumgartner, W. Interview in Der Standard, 21. Mai, 2007, p. 20, 2007.
- Bertram, B. Die Erstanpassung des Sprachprozessors bei Kindern als technische und pädagogische-psychologische Aufgabe. In: Leonhardt, A. eds. Das Cochlear Implant bei Kindern und Jugendlichen. München, Basel: Ernst Reinhardt Verlag, pp. 48-59, 1997.
- Bhatia, T.K. & Ritchie, W.C. eds. The handbook of bilingualism. Malden, Oxford, Victoria; Blackwell Publishing, 2007.
- Berke, J. Bilateral cochlea implantation. When just one won't do. 2010.

- Online <http://deafness.about.com/od/cochlearimplants/a/bilaterals.htm>
- Boyes Braem, P. Einführung in die Gebärdensprache und ihrer Erforschung. Hamburg 1990 (Internationale Arbeiten zur Gebärdensprache und Kommunikation Gehörloser 11).
- Campbell, R., MacSweeney, M. & Waters, D. Sign Language and the Brain: A Review. In: Journal of Deaf Studies and Deaf Education. 13:1, pp. 3-20, 2007.
Online: <http://jdsde.oxfordjournals.org/content/13/1/3.full.pdf+html>.
- Clark, E. How language acquisition builds on cognitive development. In: TRENDS in Cognitive Sciences, Vol. 8, pp. 472-478, 2004.
Online: <http://fias.uni-frankfurt.de/~triesch/courses/cogs1/readings/Clark04.pdf>.
- Dillier, N. & Spillmann, T. Das Cochlear-Implant für Kinder an der Ohren-Nasen-Halsklinik des Universitätsspitals Zürich. In: Günther, K.B. ed. Der Elternratgeber: Leben mit hörgeschädigten Kinder; Cochlea-Implantat (CI) bei gehörlosen und ertaubten Kindern. Hamburg: Verlag hörgeschädigte Kinder GmbH, pp. 77-83, 1997.
- Dotter, F. Gebärdensprache in der Gehörlosenbildung: Zu den Argumenten der Gegner. In: Das Zeichen 5, pp. 321-332, 1991.
- Dotter, F. Hörbehindert = gehörlos oder esthörig??? oder schwerhörig oder hörgestört oder hörgeschädigt oder hörsprachbehindert oder hörbeeinträchtigt? In: SWS-Rundschau 49, pp. 347-368, 2009.
- Emmorey, K. Language, Cognition, and the Brain. Insights from Sign Language Research. Mahwah, New Jersey, London: Lawrence Erlbaum Associates, 2002.
- Emmorey, K., Borinstein, H., Thomson, R. & Gollan, T. (2008): Bimodal bilingualism.
Online: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2600850>
- Forli, F.; Arslan, E.; Bellelli, S.; Burdo, S.; Mancini, P.; Martini, A.; Miccoli, M.; Quaranta, N. & Berrettini, S. Systematic review of the literature on the clinical effectiveness of the cochlear implant procedure in paediatric patients (Revisione sistematica della letteratura sull'efficacia clinica della procedura di impianto cocleare in età pediatrica). In: ACTA otorhinolaryngologica italica 2011:31, pp. 281-298, 2011.
Online: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3262414/pdf/0392-100X-31-281.pdf>
- Gervain, J. & Mehler J. Speech Perception and Language Acquisition in the First Year of Life. In: The Annual Review of Psychology. Vol. 61, pp. 191-218 (Volume publication date January 2010). First published online as a Review in Advance on September 28, 2009
<http://arjournals.annualreviews.org/doi/abs/10.1146/annurev.psych.093008.100408?prevSearch=gervain&searchHistoryKey>.
- Hilzensauer M., Dotter F., Maitz M., Frühstück M., Hopfgartner A., Oberauer J., Valentin A. Relay Center Austria Telefonvermittlung für gehörlose, hör- und sprachbehinderte Menschen. Klagenfurt: Veröffentlichungen des Zentrums für Gebärdensprache und Hörbehindertenkommunikation, Band 9, 2006.
- Kern, S. Die Sprachentwicklung beim Kleinkind. Studie. Europäisches Parlament. Fachreferat Struktur- und Kohäsionspolitik. Kultur und Bildung, 2006.
Online: <http://wireltern.eu/system/files/SprachentwicklungKleinkind.pdf>.
- Krammer, K. Hörimplantate: Wie effektiv sind sie wirklich? Klagenfurt: Veröffentlichungen des Zentrums für Gebärdensprache und Hörbehindertenkommunikation der Universität, Band 12, 2008.
- Krammer, K. Bilaterale Cochlea Implantate bei Kindern: Was ist ihr Nutzen? Unveröffentlichter Abschlussbericht; Klagenfurt: Zentrum für Gebärdensprache und Hörbehindertenkommunikation der Universität, , 2013.
- Kral, A. Frühe Hörerfahrung und sensible Entwicklungsphasen. In: HNO, 57, pp. 9-16, 2009.
Online: <http://www.springerlink.com/content/c204731020338647/fulltext.pdf>.
- Krausneker, V. Viele Blumen schreibt man "Blümer". Sozialisation, Entwicklung und Bildung Gehörloser, Band 4. Seedorf, Hamburg: Signum, 2004.

- Krausneker, V. taubstumm bis gebärdensprachig. Die österreichische Gebärdensprachgemeinschaft aus soziolinguistischer Perspektive, Bozen und Drava: Alfa Beta, 2006.
- Kurschatke, S. Kommunikative Situation von Kindern und Jugendlichen mit CI. Eine heilpädagogische Betrachtung (Teil I). In: Das Zeichen 56, pp. 278-287, 2001.
- Kurschatke, S. Kommunikative Situation von Kindern und Jugendlichen mit CI. Eine heilpädagogische Betrachtung (Teil II). In: Das Zeichen 57, pp. 422-428, 2001a.
- Lehnhardt, E. Das Cochlear Implant von den Anfängen bis zur verlässlichen Hilfe. In: Leonhardt, A. eds. Das Cochlear Implant bei Kindern und Jugendlichen. München, Basel: Ernst Reinhardt Verlag, pp. 19-30, 1997.
- Liddell, S. & Johnson, R. American Sign Language: The phonological base. In: Sign Language Studies 64, pp. 195-277, 1989.
- Moret, A. L. M.; Bevilacqua, M. C.; Costa, O. A. Cochlear implant: hearing and language in pre-lingual deaf children (original title: Implante coclear: audição e linguagem em crianças deficientes auditivas pré-linguais). *Pró-Fono Revista de Atualização Científica*, Barueri (SP), v. 19, n. 3, pp. 295-304, 2007.
Online: http://www.scielo.br/pdf/pfono/v19n3/en_a08v19n3.pdf
- Nussbaum, D., LaPorta R. & Hinger J. eds. Cochlear Implants and Sign Language: Putting It All Together. (Identifying Effective Practices for Educational Settings) April 11-12, 2002, Conference Proceedings. Washington, D.C.: Laurent Clerc National Deaf Education Center Gallaudet University, 2003.
Online: <http://clerccenter.gallaudet.edu/Documents/Clerc/CIandSL.pdf>
- Ribitsch, St. Gehör finden. Gehörlose: Selbstzuschreibungen, Fremdzuschreibungen und technische "Lösungen". Eine soziologische Studie rund um die Cochlea-Implantation bei Kindern. Diplomarbeit. Fakultät für Human- und Sozialwissenschaften der Universität Wien, 2002.
- Skant, A. u.a.: Grammatik der Österreichischen Gebärdensprache. Klagenfurt: Veröffentlichungen des Zentrums für Gebärdensprache und Hörbehindertenkommunikation, Band 4, 2002.
- Spencer, P. Individual Differences in Language Performance after Cochlear Implantation at One to Three Years of Age: Child, Family, and Linguistic Factors. In: Journal of Deaf Studies and Deaf Education 9:4, pp. 395-412, 2004.
Online: <http://jdsde.oxfordjournals.org/content/9/4/395.full.pdf+html>
- Stokoe, W. Sign language structure: An outline of the visual communication systems of the American deaf. Studies in Linguistics. Occasional Papers 8. New York: Published at Department of Anthropology and Linguistics, University of Buffalo, 1960.
- Szagun, G. Wie Sprache entsteht. Spracherwerb bei Kindern mit beeinträchtigtem und normalem Hören. Weinheim und Basel: Beltz Verlag, 2001.
- Szagun, G., Sondag, N., Stumper, B. & Franik, M. Sprachentwicklung bei Kindern mit Cochlea-Implantat. Carl-von-Ossietsky Universität Oldenburg. Institut für Psychologie, Abteilung Kognitionsforschung, 2006.
Online: http://www.gehoerlosen-bund.de/download/pdf/szagun_CI_Spra_Final.pdf
- Szagun, G. Sprachentwicklung bei Kindern mit Cochlea-Implantat. Ein Elternratgeber. (Überarbeitung der Broschüre von 2006), 2010.
Online: http://giselaszagun.com/de/CI_Broschuere_2010.pdf
- Werker, J.F. & Byers-Heinlein, K. Bilingualism in infancy: first steps in perception and comprehension. In: Trends in Cognitive Science, Vol. 12, No. 4, pp. 144-151, 2008.
- Wilson, B.S. & Dorman, M.F. Cochlear implants: A remarkable past and a brilliant future. In: Hearing Research 242. pp. 3-21, 2008. Online: <http://web.mit.edu/hst.723/www/ThemePapers/Implants/WilsonDormanReview2008.pdf>