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VISUAL LANGUAGE & VISUAL LEARNING

RESEARCH BRIEF:

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ADVANTAGES OF EARLY VISUAL LANGUAGE

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LEARNING FROM RESEARCH

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Key Findings on the Advantages of Early Visual Language:

- The brain is most receptive to language acquisition during "sensitive periods" early in a child's development.
- Deaf and hard of hearing children who receive early intervention services have been found to have better language outcomes up to age five.
- High levels of family involvement have been found to produce greater language development outcomes in deaf and hard of hearing children.
- Acquiring a complete first language during early childhood is critical for later reading comprehension.
- Learning two languages [that is, American Sign Language (ASL) and English] is advantageous for deaf and hard of hearing children.
- A mother's signing skills are predictive of later language development in deaf or hard of hearing children.
- A language foundation is an important factor in spoken language development.

Early Hearing Detection and Intervention

For almost twenty-five years, since the passage of PL 99-457 in 1986, young deaf and hard of hearing children and their families have received early intervention services. Age of identification has been found to be an important factor; therefore providers of early identification and intervention services aim to screen, diagnose, and provide services by 6 months of age.[1,2,3,4] However, early language acquisition is not necessarily a medical event. Early language intervention requires specialists who are knowledgeable of both visual and spoken language development. They work with families to make informed communication and educational decisions.

Over the past 20 years, numerous studies have consistently found that the earlier hearing loss is identified and the earlier intervention services are initiated, the more positive the outcomes will be for language development.[1,2,3,4,5,6,7] In a recent study, deaf and hard of hearing children who received early intervention services prior to three months of age had better language outcomes.[8] Certainly, during infancy and early childhood, sensitive periods for language acquisition correlate with the brain's development.[9] Additionally, early identification has been found to moderate factors that previously had negative effects on language development: for example, socio-economic status, family ethnicity, and the presence of additional disabilities.[1,3,7]

Multiple Pathways to Language Learning

Each deaf child acquires language in his or her own unique way. Level of hearing loss, cause of hearing loss, age when hearing loss occurred, the extent of benefit from hearing technologies, presence of additional disabilities, and family dynamics vary from child to child. Multi-sensory approaches to language acquisition ensure that when one pathway is less effective, another pathway can be used as an avenue for language learning. Early research in bilingual education found cognitive benefits from learning two languages; bilinguals have been reported to have greater cognitive flexibility and greater sensitivity to linguistic meaning than monolingual children.[10,11,12] Deaf children can experience similar cognitive benefits from learning American Sign Language and a spoken language through print and listening and speaking when appropriate.[13]

Academic Performance of Deaf and Hard of Hearing Students

Early language has ramifications for academic achievement. Deaf and hard of hearing children underperform in comparison with hearing children of similar ages in most content areas, and especially in the area of reading.[14,15,16] This is a long-standing trend that has not changed regardless of the use of various communication methodologies and the invention of new hearing technologies.[17] Despite uneven outcomes,[18] some cochlear implant teams are now advising families of children with implants to participate only in auditory-verbal therapy, and in doing so, are ignoring the enormous potential of a visual pathway to learning.[19] The lack of early and fully accessible visual language exposure may be a contributing factor to the low levels of reading achievement in the deaf population.[13,14,15,16,20,21,22]

Delay of language acquisition can have negative consequences on cognition, academic achievement, and social and emotional health.[13,17,18,23,24,25]

In contrast to children using auditory-verbal therapy, most children from deaf families enter school ready to learn because as infants and toddlers they acquired a complete first language through communicating with family members who are fluent in ASL.[26] These children tend to perform similarly to what is expected of hearing children at the same age.[8] Given signing adult language

models, deaf children with hearing parents can also acquire visual language competence and become literate.[13,27]

The Advantage of Early Visual Language

Delay in the acquisition of a first language produces poorer language performance,[28,29,30,31] regardless if the language choice is a signed language or a spoken language.[9] In addition, without access to a complete linguistic code during early development, it is difficult for deaf and hard of hearing children's language acquisition to parallel that of hearing children.[32]

Fortunately, the language areas of the brain have no preference for language input.[24,33,34] The most accessible pathway for full access to linguistic information for many deaf children is through vision.[13] Visual languages such as American Sign Language are natural language systems.[9,20] Visual languages are not merely signs that represent spoken language; they function independently from spoken languages and have fully developed grammatical systems.[35]

Some innovative early intervention programs have recognized the need for early visual language learning in children receiving implants. In one such program, a study revealed that children who were exposed to sign language while waiting for cochlear implants developed receptive language: they understood comments, questions, explanations, commands, and they were signing simple phrases.[36] In these programs, children achieving the most effective language outcomes signed early, suggesting that having access to early language, regardless of the modality, can provide a base on which skills in a different language modality can be built.[36,37] After implantation, these children developed spoken language. The sign lexicon that the children acquired before implantation most likely facilitated rapid mapping onto speech.[36,37,38]

Signed Language and Spoken Language Development

Early language experiences create the ability to learn throughout the lifespan, regardless of the mode of communication.[9] Signed language is sometimes withheld from deaf children in the belief that it interferes with speech development.[19] However, there is no evidence that using a signed language with deaf and hard of hearing children impedes spoken language development.[19,39] Rather, spoken language skills increase as children learn more gestures and signs.[25,40,41] Proficiency in ASL has been shown to positively influence spoken language development and the development of English literacy in deaf students.[16,42,43,44] It is language that facilitates spoken language, not the mode of communication.[45]

Benefits of Bilingualism

There are linguistic and educational benefits of learning two languages (for example, American Sign Language and spoken/written English).[46] Deaf children can acquire two languages simultaneously when adult language models follow language allocation strategies, where the amount of exposure to a spoken/written language is increased as the child acquires first language competence.[47] ASL, in many cases, functions as a first language or (L1), which supports the acquisition of spoken/written English as a second language (L2). On the whole, bilingual research has shown that fluency in a first language is a strong predictor of second language skill; competence in a second language is a function of proficiency in a first language.[48,49]

Family Involvement

Family involvement is a critical factor in the language development of deaf and hard of hearing children, especially those with hearing parents.[2] It is important to note that high levels of family involvement produce higher language outcomes.[2] In addition, maternal signing skill appears to be another powerful indicator that results in better

language performance in deaf and hard of hearing children.[6,18] Further, these factors have been found to buffer the negative effects of late enrollment in early intervention programs.[2]

Integration of Research in Education

VL[2] publishes research briefs as a resource for educators and parents. The goal is to inform the education community of research findings, to summarize relevant scholarship, and to present recommendations that educators and parents can use when addressing the multifaceted challenges of educating deaf and hard of hearing children.

The information provided in this brief is intended to clarify the importance of early visual language development in deaf and hard of hearing infants and toddlers.

Research briefs are available at vl2.gallaudet.edu.

References

1. Apuzzo, M., & Yoshinaga-Itano, C. (1995). Early identification of infants with significant hearing loss and the Minnesota Child Development Inventory. *Seminars in Hearing, 16*(2), *124–139.*
2. Moeller, M. P. (2000). Early intervention and language development in children who are deaf and hard of hearing. *Pediatrics,106*(3), e43. Retrieved Nov. 20, 2010, from http://www.pediatrics.org/cgi/content/full/106/3/e43
3. Yoshinaga-Itano, C., Sedey, A., Coulter, D., & Mehl, A. (1998). Language of early- and later-identified children with hearing loss. *Pediatrics, 102*(5), 1161–1171.
4. Calderon, R., & Naidu, S. (2000). Further support for the benefits of early identification and intervention for children with hearing loss. *The Volta Review, 100*(5), 53–84.
5. Snyder, L. &Yoshinaga-Itano, C. (1998). Specific play behaviors and the development of communication in children with hearing loss. *The Volta Review, 100*(3), 165-185.
6. Calderon, R. (2000). Parental involvement in deaf children's education programs as a predictor of child's language, early reading, and social-emotional development. *Journal of Deaf Studies and Deaf Education*, *5*(2), 140-155.
7. Yoshinaga-Itano, C. (2003). From screening to early identification and intervention: Discovering predictors to successful outcomes for children with significant hearing loss. *Journal of Deaf Studies and Deaf Education*, *8*(1), 11-30.
8. Vohr, B., Moore, P., & Tucker, R. (2002). Impact of family health insurance and other environmental factors on universal hearing screen program effectiveness. *Journal of Perinatology, 22*(5), 380–385. Retrieved Nov. 20, 2010, from http://www.nature.com/jp/journal/v22/n5/pdf/7210750a.pdf
9. Mayberry, R. & Lock, E. (2003). Age constraints on first versus second language acquisition: Evidence for linguistic plasticity and epigenesis. *Brain and Language, 87*(3), 369-384. Retrieved Nov. 20, 2010, from http://idiom.ucsd.edu/~rmayberry/pubs/Mayberry-Lock-03.pdf
10. Cummins, J. (2001). *Negotiating identities: Education for empowerment in a diverse society.* (2nd ed.) Los Angeles: California Association for Bilingual Education.
11. Hakuta, K. (1986). *Mirror of language: The debate on bilingualism.* New York: Basic Books.
12. Hakuta, K. & Diaz, R. (1985). The relationship between degree of bilingualism and cognitive ability: A critical discussion and some new longitudinal data. In K. E. Nelson (Ed.), *Children's Language* (pp. 319-344). Hillsdale, N. J.: Lawrence Erlbaum Associates.
13. Easterbrooks, S. & Baker, S. (2002). *Language learning in children who are deaf and hard of hearing: Multiple pathways.* Boston: Allyn & Bacon.
14. Andrews, J., Leigh, I., & Weiner, M. (2004). *Deaf people: Evolving perspectives from psychology, education, and sociology.* Boston: Pearson.
15. Chamberlain, C. & Mayberry, R. (2000). Theorizing about the relationship between American Sign Language and reading. In C. Chamberlain, J. Morford, & R. Mayberry (Eds.), *Language acquisition by eye* (pp. 221-260). Mahwah, NJ: Lawrence Erlbaum Associates.
16. Goldin-Meadow, S. & Mayberry, R. (2001). How do profoundly deaf children learn to read? *Learning Disabilities Research and Practice, 16*(4), 222-229.

17. Allen, T. (1986). Patterns of academic achievement among hearing impaired students: 1974 and 1983. In A. Schildroth & M. Karchmer (Eds.), *Deaf children in America* (pp. 161–206). San Diego: College Hill Press.

18. Meadow-Orlans, K., Spencer, P., Koester, L. & Steinberg, A. (2004). Implications for intervention with infants and families. In K. Meadow-Orlans, P. Spencer, & L. Koester (Eds.), *The world of deaf infants: A longitudinal study* (pp. 218-228). New York: Oxford University Press.

19. Snodden, K. (2008). American Sign Language and early intervention. *The Canadian Modern*

    Language Review, 64(4), 581-604.

20. Hoffmeister, R. (2000). A piece of the puzzle: ASL and reading comprehension in deaf children. In C. Chamberlain, J. Morford, & R. Mayberry (Eds.), *Language acquisition by eye* (pp. 143–163). Mahwah, NJ: Lawrence Erlbaum Associates.

21. Erting, C., Prezioso, C., O'Grady-Hynes, M. (1990). The interactional context of deaf mother-infant communication. In V. Volterra & C. Erting (Eds.), *From gesture to language in hearing and deaf children* (pp. 97-106). Berlin: Springer-Verlag.

22. Anderson, D. (2006). Lexical development of deaf children acquiring signed languages. In B. Schick, M. Marschark & P. Spencer (Eds.), *Advances in the sign language development of deaf children* (pp. 135-160). New York: Oxford University Press.

23. Marschark, M., Lang, H. & Albertini, J. (2002). *Educating deaf students: From research to practice*. New York: Oxford University Press.

24. Meier, R. (1991). Language acquisition by deaf children. *American Scientist*, 79, 60-70.

25. Schlesinger, H. & Meadow, K. (1972). *Sound and sign: Childhood deafness and mental health*. Berkeley, CA: University of California Press.

26. Marschark, M, Schick, B., & Spencer, P. (2006). Understanding sign language development of deaf children. In B. Schick, M. Marschark & P. Spencer (Eds.), *Advances in the sign language development of deaf children* (pp. 3-18). New York: Oxford University Press.

27. Singleton, J., Supalla, S., Litchfield, S., & Schley, S., (1998). From sign to word: Considering modality constraints in ASL/English bilingual education. *Topics in Language Disorders, 18*(4), 16-29.

28. Boudreault, P. (1999). *Grammatical processing in American sign language: Effects of age of acquisition and syntactic complexity.* Unpublished masters thesis, McGill University.

29. Mayberry, R. (1993). First-language acquisition after childhood differs from second-language acquisition: The case of American Sign Language. *Journal of Speech and Hearing Research, 36*, 1258-1270.

30. Mayberry R. & Eichen, E. (1991). The long-lasting advantage of learning sign language in childhood: Another look at the critical period for language acquisition. *Journal of Memory and Language, 30*(4), *486-512.*

31. Mayberry, R. & Fischer, S. (1989). Looking through phonological shape to lexical meaning: The bottleneck of non-native sign language processing. *Memory & Cognition, 17*(6), 740-754.

32. Lederberg, A.R. & Everhart, V.S. (1998). Communication between deaf children and their hearing mothers: The role of language gesture, and vocalizations. *Journal of Speech, Language, and Hearing Research, 41,* 887-899.

33. Newport, E. & Meier, R. (1985). The acquisition of American Sign Language. In D. Slobin (Ed.), *The cross linguistic study of language acquisition, Volume One: the Data* (pp. 881-938). Hillsdale, NJ: Lawrence Erlbaum Associates.

34. Petitto, L.A. (2000). On the biological foundations of human language. In K. Emmorey & H. Lane (Eds.), The *signs of language revisited: An anthology in honor of Ursula Bellugi and Edward Klima* (pp. 449-471). Mahwah, NJ: Lawrence Erlbaum Associates.

35. Emmorey, K. (2002). *Language, cognition and the brain: Insights from sign language research*. Mahwah, NJ: Lawrence Erlbaum Associates.

36. Yoshinaga-Itano, C. (2008). *Lessons learned from universal newborn hearing screening*. Paper presented at the annual meeting of the Conference of Educational Administrators of Schools for the Deaf, Great Falls, MT.

37. Yoshinaga-Itano, C. (2006). Early identification, communication modality, and the development of speech and spoken language skills: Patterns and considerations. In P.E. Spencer & M. Marschark (Eds.), *Advances in the spoken language development of deaf and hard-of-hearing children* (pp. 298-327). New York: Oxford University Press.

38. Yoshinaga-Itano, C. (2005). *From Sign language to spoken language: Evidence of a lexical piggyback in the language of children with cochlear implants.* Paper presented at the annual meeting of the Symposium of Research in Child Language Disorders, Madison, WI.

39. Marschark, M. & Hauser, P. (2008). *Deaf cognition: Foundations and outcomes.* New York: Oxford University Press.

40. Crittenden, J., Ritterman, S., & Wilcox, E. (1986). Communication mode as a factor in the performance of hearing impaired children on a standardized receptive vocabulary test. *American Annals of the Deaf, 131,* 356-360.

41. Volterra, V., Iverson, J., & Castrataro, M. (2006). The development of gesture in hearing and deaf children. In B. Schick, M. Marschark, & P. Spencer (Eds.), *Advances in the sign language development of deaf children* (pp. 46–70). New York: Oxford University Press.

42. Padden, C., & Ramsey, C. (1998). Reading ability in signing deaf children. *Topics in Language Disorders*, *18*(4), 30–46.

43. Padden, C., & Ramsey, C. (2000). American Sign Language and reading ability in deaf children. In C. Chamberlain, J. Morford, & R. Mayberry (Eds.), *Language acquisition by eye* (pp. 165–189). Mahwah, NJ: Lawrence Erlbaum Associates.

44. Prinz, P., & Strong, M. (1998). ASL proficiency and English literacy within a bilingual deaf education model of instruction. *Topics in Language Disorders, 18*(4), 47–60.

45. Yoshinaga-Itano, C., & Sedey, A. (2000). Speech development of deaf and hard of hearing children in early childhood: Interrelationships with language and hearing. *The Volta Review, 100*(5), 181–211.

46. Nover, S., Christensen, K., & Chen, L. (1998). Development of ASL and English competence for learners who are deaf. *Topics in Language Disorders, 18*(4)*,* 61-72.

47. Nover, S., Andrews, J., Baker, S., Everhart, V., Bradford, M. (2002). *Staff development in ASL/ English bilingual instruction for deaf students: Evaluation and impact study*. Center for ASL/English Bilingual Education and Research: New Mexico School for the Deaf.

48. Cummins, J. (2000). *Language, power, and pedagogy: Bilingual children in the crossfire*. Buffalo, NY: Multilingual Matters, Ltd.

49. Dickinson, D., Golinkoff, R., & Hirsh-Pasek, K. (2010). Speaking out for language: Why language is central to reading development. *Educational Researcher*, *39* (4), 305-310. *Data* (pp. 881-938). Hillsdale, NJ: Lawrence Erlbaum Associates.Research in Child Language Disorders, Madison, WI.

credits

Writer: Sharon Baker, Ed.D
Editor: Kristen Harmon, Ph.D.
Design: Melissa Malzkuhn, M.A.
Consultant: Diane Clark, Ph.D.