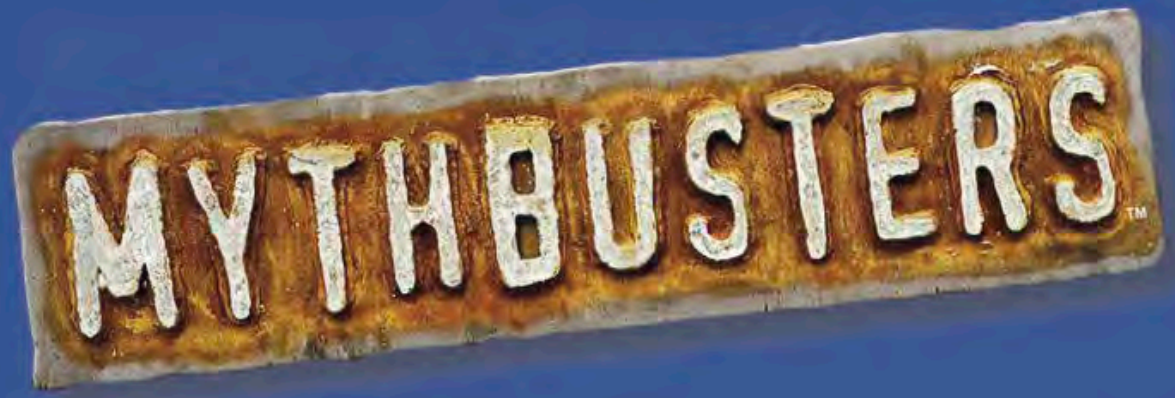

#1

Early exposure to two languages causes language delay and language confusion.

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- Decades of research have shown that early exposure to two languages does not cause language delay and language confusion. BL2 and VL2 Center findings have uncovered strong evidence for a critical period of development in which early exposure to bilingualism is a key predictor of language, reading, literacy success, and advantages in select neuro-cognitive functions.
- The brain gains enormous benefits from early exposure to two languages. Early-exposed bilingual language learners show language processing and reading enhancements in each of their two languages, and stronger cognitive flexibility, compared to monolingual peers. These powerful language and reading advantages continue across the lifespan. Thus, infancy and early childhood are the best times of life to be exposed to two languages.
- Deaf children exposed to a signed language and a spoken language (such as English) have been shown to be indeed "bilingual children" and receive all such bilingual advantages!

Implications: Parents and educators can be confident in the benefits of learning and using multiple languages as early as possible with all children. With deaf infants, ASL-English bilingual language learning launches infants on the path to becoming healthy bilinguals with strong English skills.

#2

To be a good reader, students with multiple language exposure must practice harder at only their English skills.

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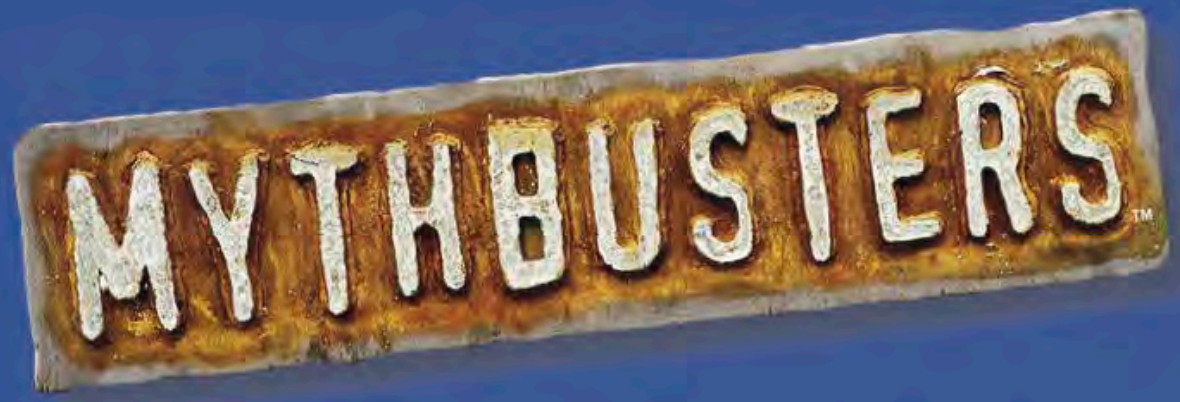
- To be a good reader in English, students gain great benefits from having competence and practice in the multiple languages to which they have been exposed.
- Most common across these studies is that all children need access to the patterning at the heart of language in early life to facilitate a cascade of other developments that are central to learning vocabulary, language learning, and reading success.
- Research shows that early sign-exposed deaf children have a larger vocabulary size in English and at a younger age, and are ready to write letters earlier, because of early experience with sign language and its patterning. In fact, these students are bolstered by their proficiency in ASL and fingerspelling patterning, which in turn strengthens their literacy skills in English. Surprisingly, some early sign-exposed deaf children have been observed to become faster and more accurate readers in English as compared to monolingual hearing peers.

Implications: Exclusive focus on drilling in only one language, e.g., English, is not optimal. Building language skills in each of a child's languages (e.g., Spanish and English) will provide powerful reading advantages in English. Likewise, building ASL and English skills in a young deaf child will provide the same powerful reading advantages in English.



#3

Speech and sound are absolutely necessary to achieve normal language acquisition. Early exposure to sign harms normal spoken language acquisition.

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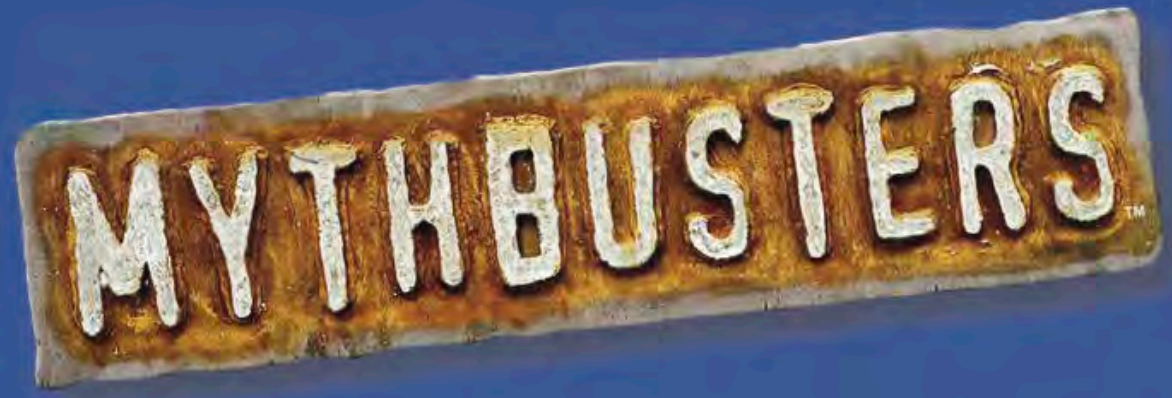
- All hearing children acquire language on a strikingly regular developmental timetable, revealing the same universal language acquisition milestones: babbling ~6 months, first words ~12 months, first two-word combinations ~18 months, etc. This was thought to be due to the importance of speech development and hearing.
- Children with early exposure to signed languages achieve every one of these universal milestones in language acquisition and on the same developmental timetable (including babbling ~6 months — but on their hands!).
- Studies of early sign-exposed deaf children show that exposure to a visual language facilitates the acquisition of spoken language. The classic patterns of bilingual language learning are present even though one language is soundless and the other is based on sound.

Implications: Speech and sound are not necessary for normal language learning. Early sign exposure does not harm a child's chances of learning English; it helps. A child who is exposed to sign and English is bilingual. All children receive benefits from early bilingual language exposure. A bilingual ASL-English language learning model is vital to young deaf children's normal language acquisition and academic success. The belief that learning sign language should wait until the child is older risks the deaf child missing the critical language development period and the benefits that come from bilingual learning.



#4

Speech and sound are absolutely necessary to become a successful reader.

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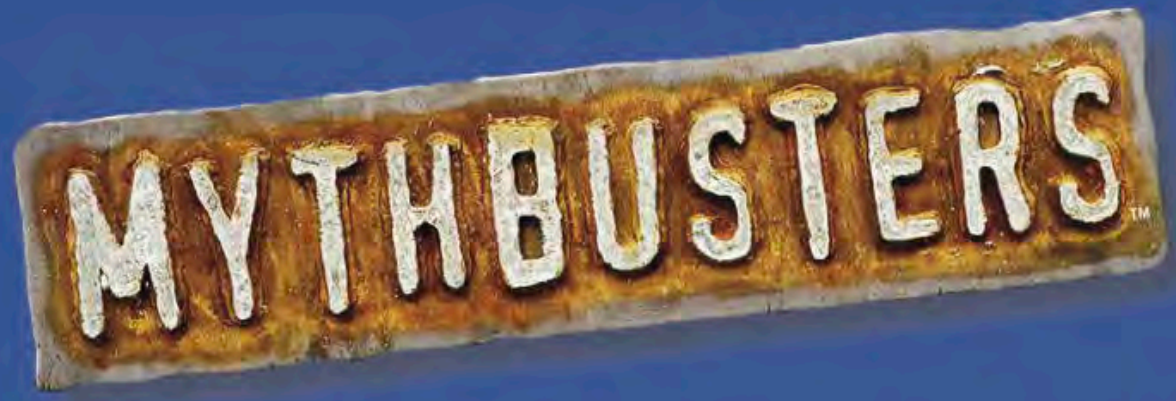
- Studies of hearing children have found that they use multiple pathways to successful reading. BL2 and VL2 studies of skilled deaf readers have found that they also develop multiple pathways to successful reading, including the use of visual sign phonological segmentation and patterning, visual patterning in print, and other cues, to decode English print.
- Like a hearing child who builds a sound phonology from the bits of sound segments and the patterning around them (sound-phonetic and sound-syllabic units), the deaf emergent reader builds an identical abstract level of language organization from the bits of visual signed language segments and the patterning around them (sign-phonetic and sign-syllabic units in Visual Sign Phonology). This critical information enables them to segment and decode text on the printed page en route to meaning.
- Moreover, deaf children who are taught these building blocks of sign-phonetic and sign-syllabic organization (inclusive of fingerspelling) receive powerful reading benefits in English, even those with cochlear implants or hearing aids and who receive intensive speech training.

Implications: Speech and sound are not necessary for successful reading. Recognizing that VSP can support, even enhance, development of English reading skills can have a revolutionary impact. Sign-phonemic awareness and fingerspelling segmentation can be incorporated into classroom strategies to catapult reading success.



#5

The parts of the brain
that process spoken languages
are different from the parts of the brain
that process signed languages.

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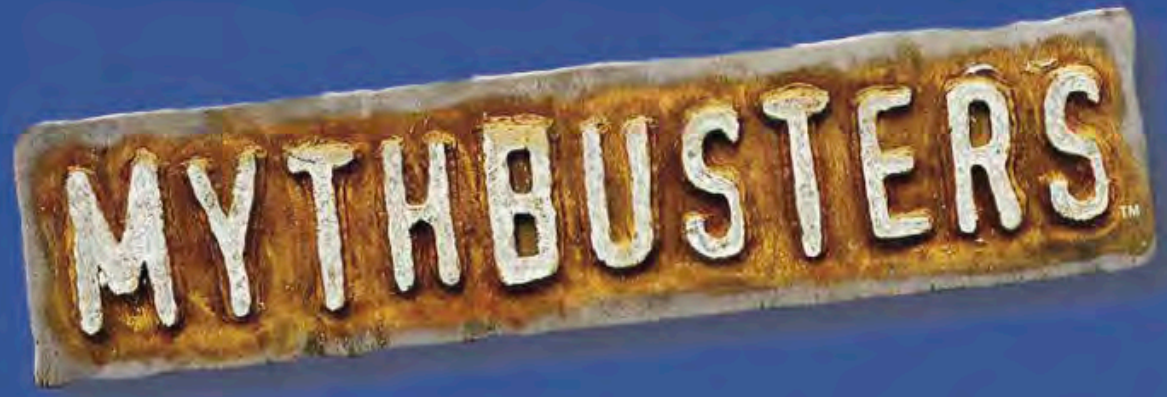
- The parts of the brain that process spoken languages and signed languages are largely the same. The brain does not discriminate against modality. Neuroimaging studies of deaf adults who sign and hearing adults who speak have shown that signed and spoken languages are processed in largely the same brain tissue.
- This even involves brain tissue and neural systems that were thought to be uniquely evolved for speech because these brain systems were located near the human ear. For example, studies have shown that sign-phonetic units in signed languages are processed in the same tissue as sound-phonetic units in spoken languages. This is also true of other levels of language organization, such as syntax, morphology, and semantics.

Implications: All human language is built from the brain's sensitivity to specific patterns at the heart of language. Language patterns are key to the brain — not sound. This is universal. The biological equivalence of signed and spoken languages compels society and educational policy to give ASL the identical rights and legal protections as all spoken languages.



#6

Early sign language 'colonizes' the part of the brain needed to process speech and sound, damaging a deaf child's chances of learning spoken English.

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- Early exposure to sign language appears to act as a biological "wedge" that opens up — and keeps open — the brain's capacity to learn language patterning at the heart of spoken and written English.
- Recent neuroimaging studies have found that deaf individuals who learned sign language later in life, after cochlear implantation and intensive speech therapy, show the most atypical auditory tissue/brain activity during language processing. By contrast, deaf individuals who learned sign language first and early in life, followed by cochlear implantation and intensive speech training, show the most typical brain and auditory tissue processing for language. Their processing is, in fact, no different from that seen in hearing individuals.
- BL2 and VL2 studies have found that having a strong language foundation (i.e. in ASL) correlates with stronger speech abilities for children who can access speech through hearing aids or cochlear implants. Multiple studies have shown that deaf individuals who sign, speak better.
- Early ASL-English bilingual-bimodal language exposure does not block the development of speech, but late exposure may impair language and cognitive development.

Implications: Parents and educators need not fear that early exposure to sign language will damage a deaf child's chances of learning spoken English. Nor does ASL "take over" the part of the brain needed for processing speech and sound. To achieve the benefits to speech and spoken language, it is essential that exposure is provided during the all-critical early language developmental period.

#7

Deaf people are disabled.

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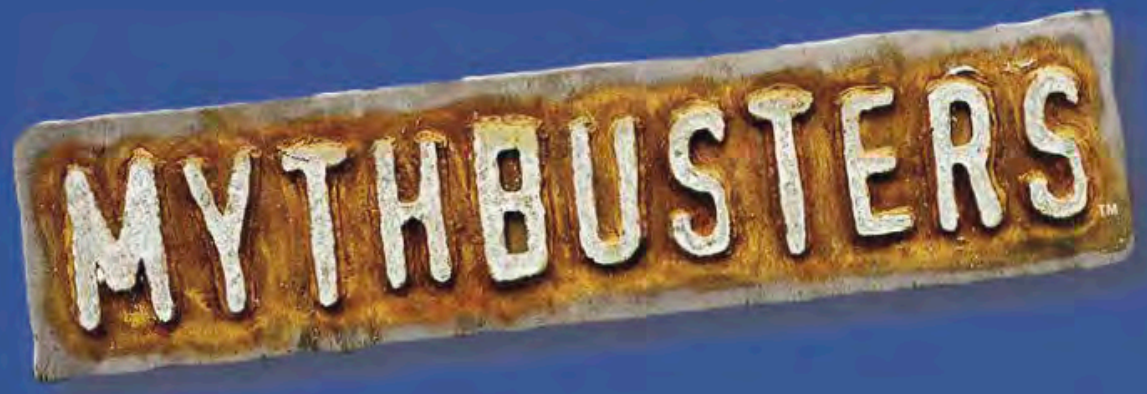
- The deaf child's brain at birth is biologically as normal as any hearing child's brain. Deaf and hearing infants' brains are fundamentally similar, with the normal processes of neuroplasticity over time.
- With systematic early visual language exposure, deaf children gain important higher cognitive processing advantages over age-matched hearing peers.
- Forty decades of research have shown many ways in which deaf child's brain can become quickly *advantaged* in early life if exposed to a visual language as part of early bilingual sign-speech language learning. These children gain greater visual processing, language, and reading skills, as well as select cognitive flexibility and social-regulation benefits relative to hearing children of the same age.

Implications: All children need early exposure to natural language, with devastating lifelong deleterious consequences if this is not the case (for example, children raised in under-resourced contexts). Helping educators and medical professionals to be aware of the advantages of early visual language exposure, in addition to speech, could spare many deaf and hard of hearing infants the adverse — even disabling — neurological and life impacts resulting from early language deprivation that can be caused by exposure solely to speech.



#8

What will we bust next?

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The myths and science reported in these cards are drawn from a larger science article written by Dr. Laura-Ann Petitto.

Petitto, L. A. "7 Myths and The Science That Can Change our Minds: The Implications of Educational Neuroscience Research for Policy Change in the Young Deaf Child." In Patricia Kuhl and Sonia Guerriero (Eds.), Organization for Economic Co-operation and Development (OECD); forthcoming.

Some of the research findings reported here can be downloaded at Petitto's BL2 research website: http://petitto.net/pubs