

A photograph of a desk with a laptop, a pair of glasses, a notebook, and a vase with a plant. The text is overlaid on the right side of the image.

Language Deprivation in Deaf and Hard of Hearing Children: What Medical Professionals Need to Know

Kimberly Ofori-Sanzo, SLPD, CCC-SLP, BCS-CL



Disclosures

- Financial disclosure: I am the owner and founder of Language First and I am receiving payment for presenting today
- Nonfinancial disclosure: I am a member of the American Speech and Hearing Association (ASHA) and the American Board of Child Language and Language Disorders (ABCCLD)

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Who Am I?

- A speech-language pathologist
 - Bachelors in Speech-Language Pathology and Psychology
 - Masters in SLP from Gallaudet
 - Doctor of Speech-Language Pathology
 - Board certified child language specialist
 - 9 years at a school for the Deaf
- Heritage speaker of French and Italian
- Founder, Language First



**AMERICAN
SCHOOL FOR
THE
DEAF**

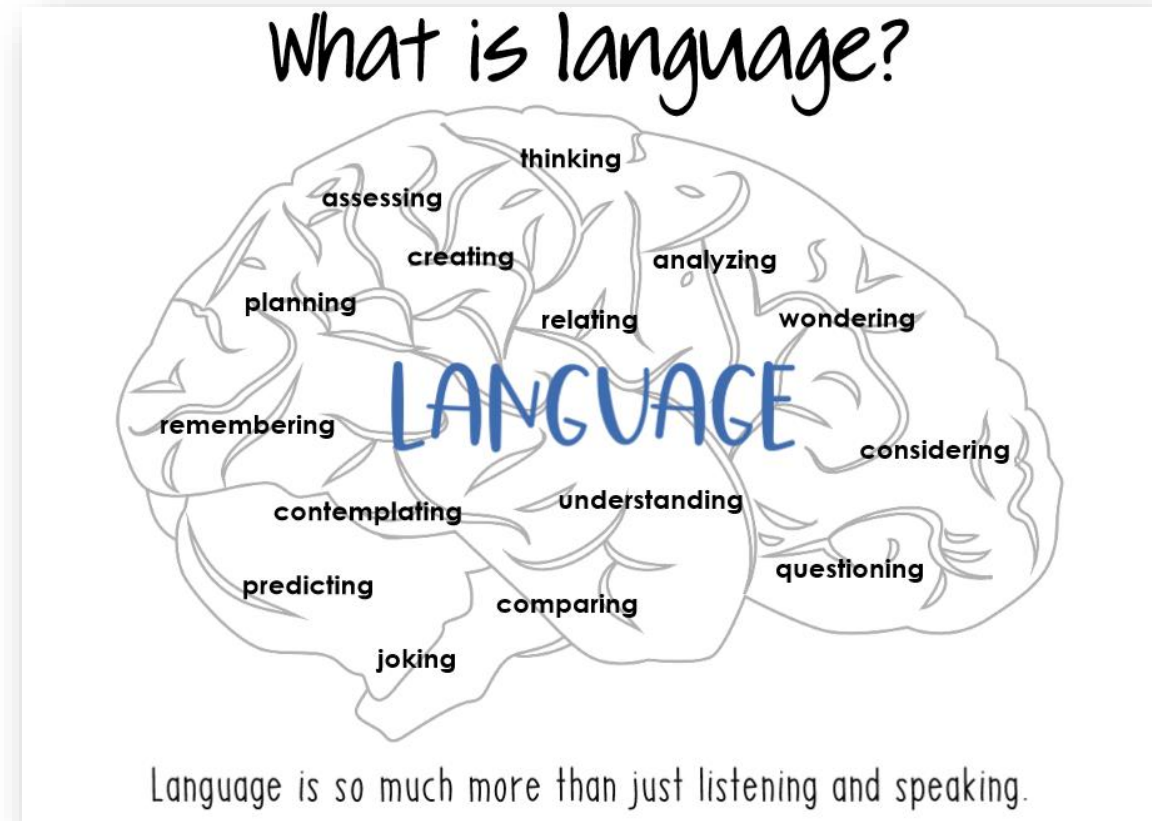
ALL ways able.



ROCKY MOUNTAIN
UNIVERSITY *of*
HEALTH PROFESSIONS

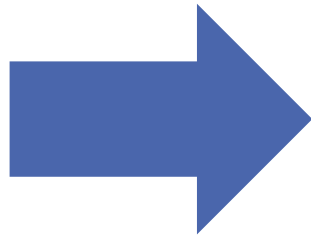
What Is Language?

- Uniquely human ability to communicate **abstract** thoughts and ideas
 - Different from communication, speech, and listening
- A complex system that humans acquire naturally and **effortlessly**
- Can be expressed **naturally** through speech or sign
 - Or man-made modes (i.e. writing, typing, eye gaze devices, etc.)
- Sound is not language



Receptive

What are some ways to get language into the brain?

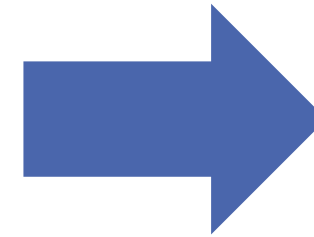


- Viewing
- Listening
- Tactile
- Reading



Expressive

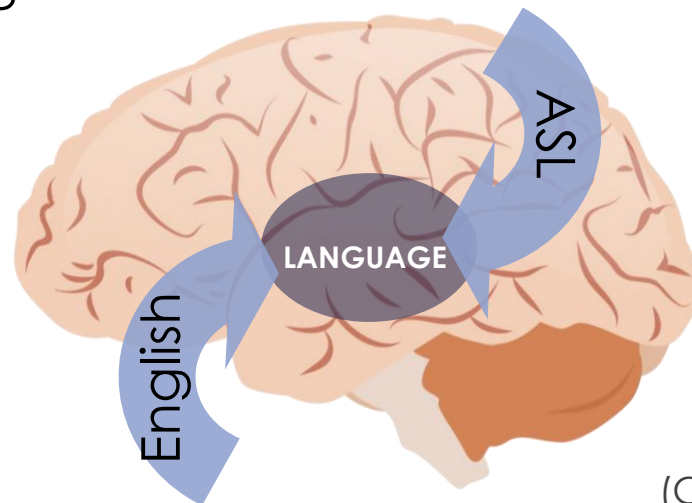
What are some ways to get language out of the brain?



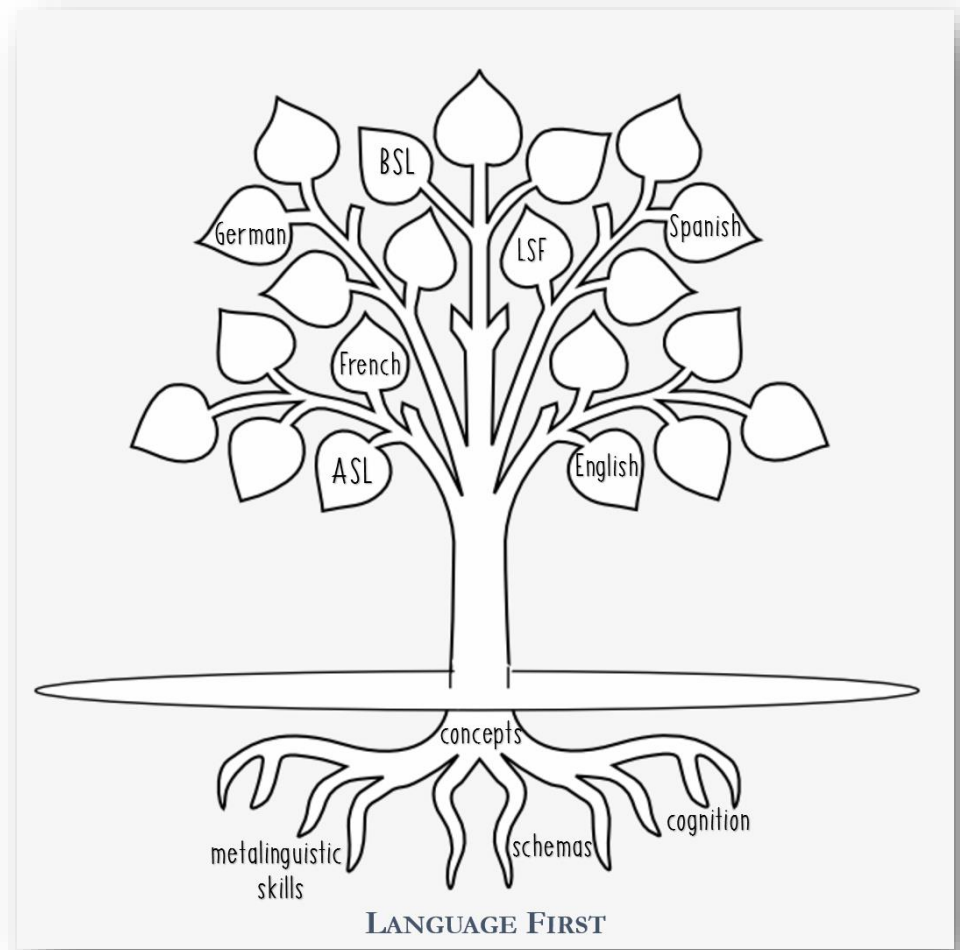
- Signing
- Speaking
- Writing
- Typing

Common Underlying Proficiency (CUP)

- Development in any language contributes to general linguistic development regardless of the language in which it occurs
- Experiences with L1 or L2 promote proficiency in both languages
- Two channels that feed into a common language center



(Cummins, 1980)

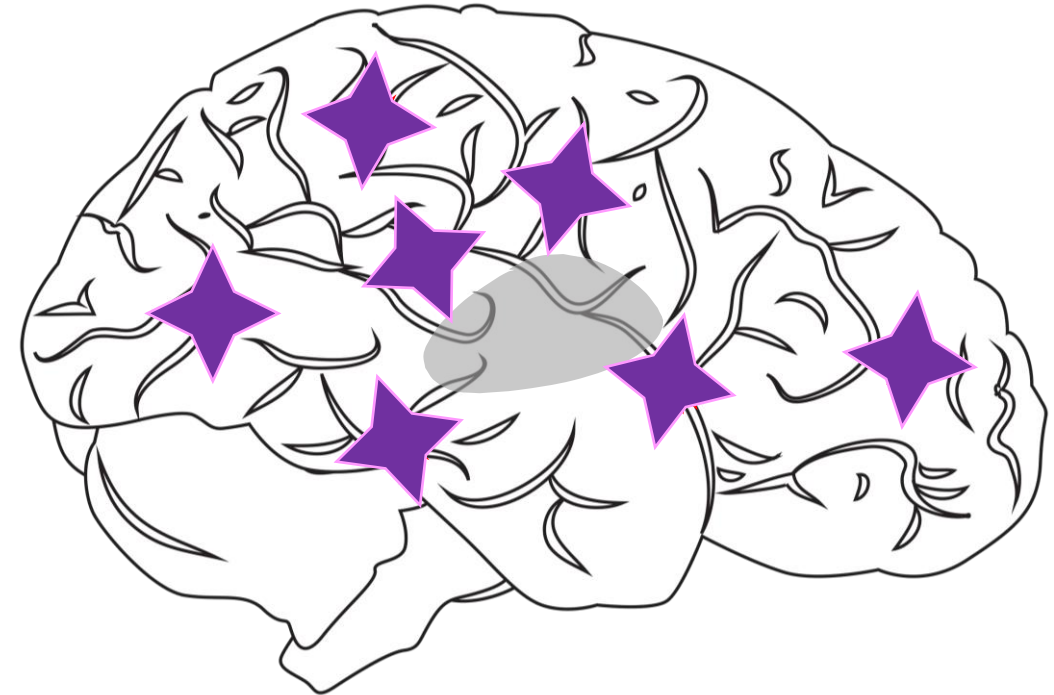


Brain Development

- The brain is made up of neurons that change in response to outside signals
- Deprivation of required experiences can cause the brain to become organized in dysfunctional ways (Twardosz & Lutzker, 2010)
- The case studies who suffered language deprivation during childhood developed less robust connections between language regions (Cheng et al., 2019)

Neuroplasticity

- Can be in response to injury, **development**, or **sensory input**
- The brain can “reroute” tasks normally assigned to one section of the brain to another **if there’s not enough stimulation**
 - Activation in the auditory area during sign language task because the participant had not received auditory input while that neural network was being formed (Nishimura et al., 1999)

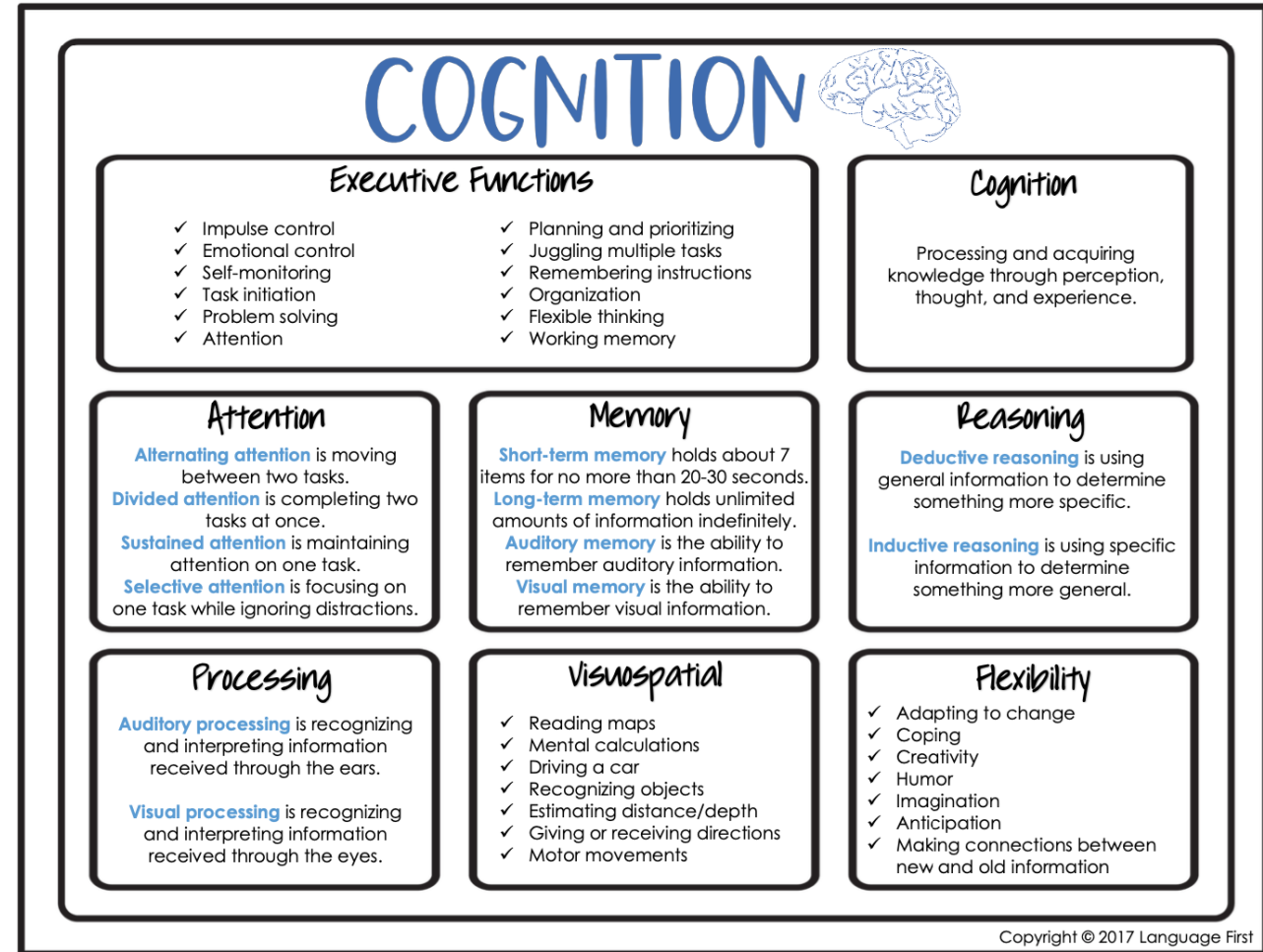


Fox et al. (2010)

- The foundation of brain architecture lies in the early developmental years
- Early experiences affect the quality of brain architecture by establishing either a sturdy or fragile foundation for all learning that follows (Center on the Developing Child, 2007)
- Advanced perceptual processes are dependent upon the normal development of basic systems
 - The early development of brain pathways is like laying the foundation for a building; if the foundation is only partially laid, **the building may not be constructed as it was originally intended but a functional alternative may be reached**

Cognitive-Linguistic Development

- Language and cognition are interwoven
- The depressed language of deaf children is not caused by and does not cause general intellectual deficiencies in cognitive domains that are independent of language (Mayberry, 2002)
- In the normal course of development, language is intertwined with abilities in the cognitive, social, and emotional domains, and vice versa (Im-Bolter & Cohen, 2007)



Language Deprivation

- A **chronic** lack of **full access** to a **natural language** during the **critical period** of language acquisition (Hall et al., 2017)
- Results in significant, irreversible, and long-lasting effects on language and cognition

Chronic

- A **chronic** lack of full access to a natural language during the critical period of language acquisition (Hall et al., 2017)
- Continuing or occurring again and again for a long time
- Examples:
 - A child who did not get amplification until the age of 2
 - A child whose amplification intermittently breaks or gets lost
 - A child who refuses to wear amplification
 - A child who had amplification for a years but did not get benefit from it

Chronic

- Which would be considered chronic lack of access to language?
 - A hearing child who can't hear his parents during a loud concert
 - A deaf child who has cochlear implants that give him migraines
 - A hearing child who has frequent ear infections
 - A deaf child who has deaf parents who use ASL with him

Chronic

- Which would be considered chronic lack of access to language?
 - ~~A hearing child who can't hear his parents during a loud concert~~
 - **A deaf child who has cochlear implants that give him migraines**
 - **A hearing child who has frequent ear infections**
 - ~~A deaf child who has deaf parents who use ASL with him~~

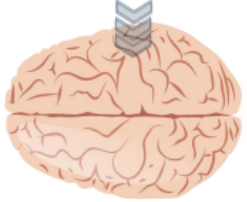
Full Access

- A chronic lack of **full access** to a natural language during the critical period of language acquisition (Hall et al., 2017)
- If a child is exposed regularly and frequently to a language and picks up that language naturally without explicit training and exercise, the language qualifies as accessible to that child (Humphries et al., 2016)
- Think of a bad phone connection

FULL ACCESS FOR LANGUAGE

What does it mean when we say “full access” when talking about Deaf children?

Access means entry into the brain.



Access does **not** refer to the *quality* of language input. In other words, a deaf child would still have full access to the signing of someone who is not fluent in ASL. Similarly, a deaf child may not have full access to oral English, even if the person is using rich language structures.

If any of these are true, your child does **NOT** have full access to oral language:

- ✚ Your child can hear *most* sounds *most* of the time
- ✚ Your child struggles to hear in background noise
- ✚ Your child must take hearing equipment off in the water
- ✚ Your child struggles to follow conversation at the dinner table
- ✚ Your child isn't able to wear hearing equipment at any point during the day

REMEMBER:

When there is a language stimulus, the child must be able to obtain **all parts** of that stimulus.

For example, if the teacher says, “Get your books” and the child misses the /k/ and the /s/ in *books*, that child does not have **full access**.

Language accessibility

Naturally occurring signed languages (ASL, BSL) are the only languages that are 100% accessible to Deaf children.

Cumulative effect

Missing small bits of language here and there adds up, and it has a cumulative effect. It can permanently affect brain development.

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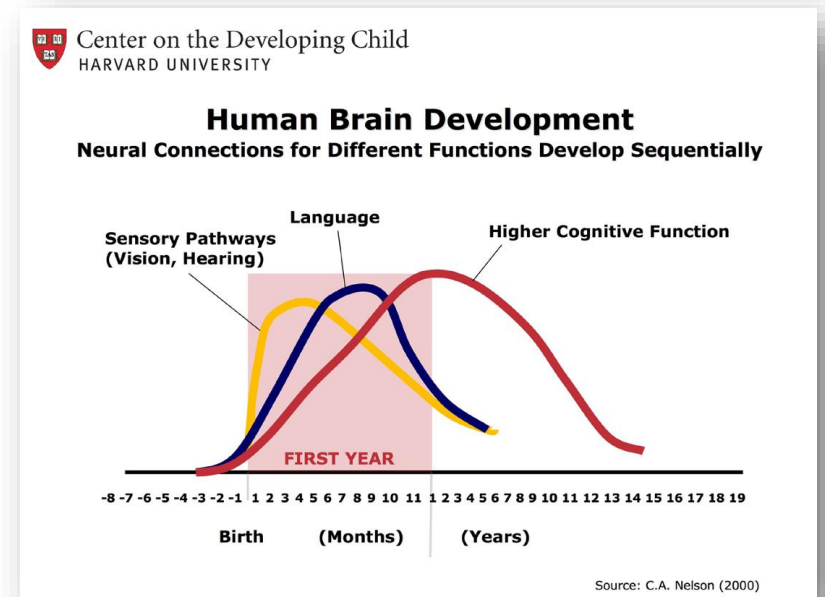
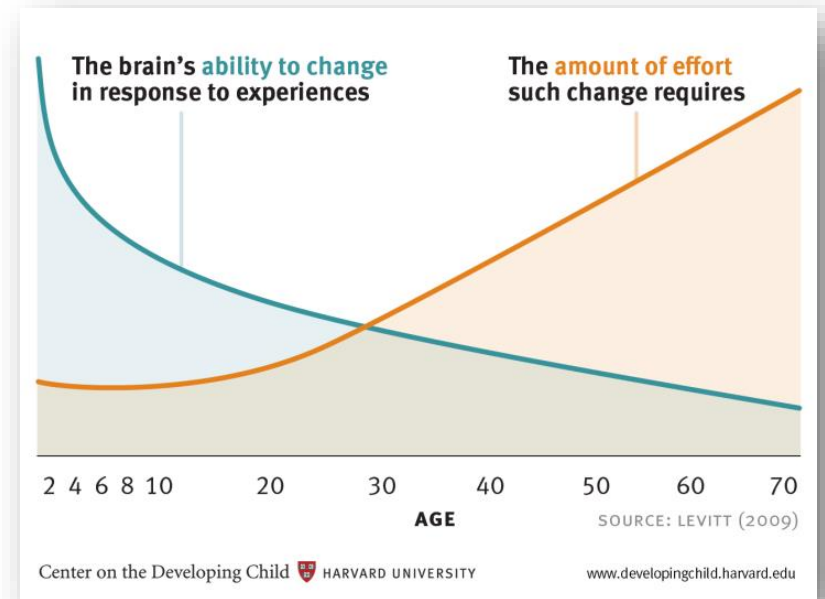
Natural Language

- A chronic lack of full access to a **natural language** during the critical period of language acquisition (Hall et al., 2017)
- Came about organically among a group of people
 - Signed systems like Signing Exact English or Manually Coded English are **not** naturally occurring languages

	Receptive	Expressive
Natural	Viewing, listening	Signing, speaking
Man-made	Reading	Writing, typing

Critical Period

- A chronic lack of full access to a natural language during the **critical period** of language acquisition (Hall et al., 2017)
- There is an elevated neurological sensitivity for language development for approximately the first five years of a child's life (Hall et al., 2017)
- Onset characterized by change in molecular **triggers** that move neural circuits to a pliable state, while the offset is defined by molecular **brakes** that physically prevent further structural changes and move the neural circuit to a stable state (Friedmann & Rusou, 2015)

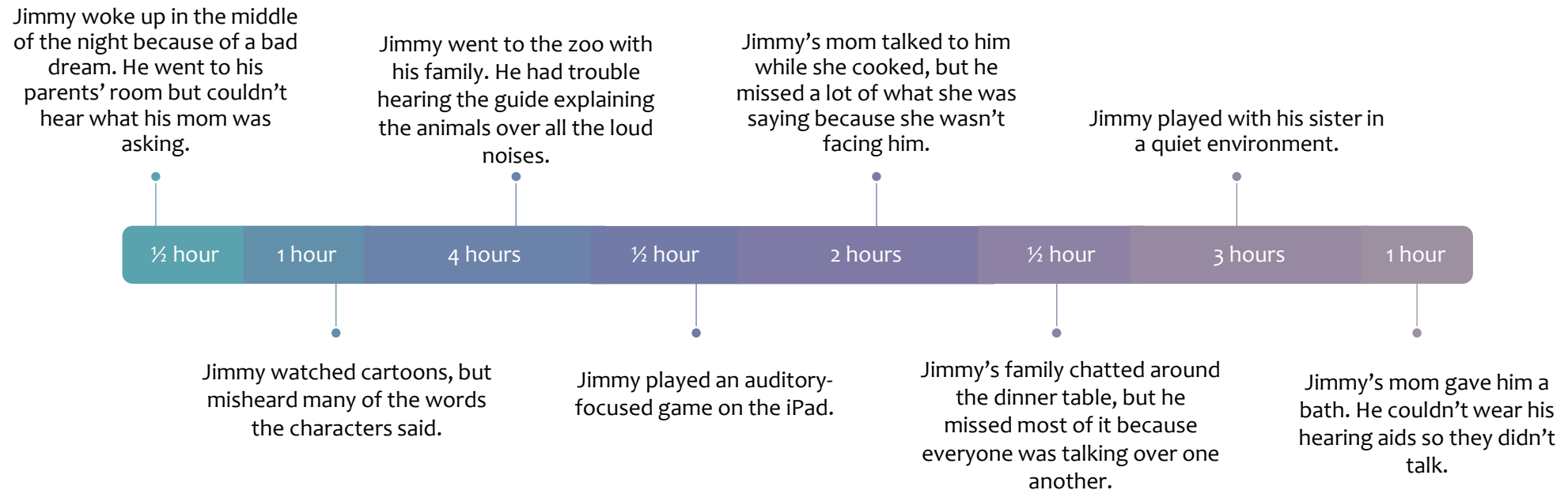


Critical Period

- Marschark (2010) states that diverse studies conclude:
 - Early L1 acquisition leads to native-like language proficiency
 - Early L1 acquisition supports and facilitates L2 learning
 - A lack of early L1 acquisition impairs the ability to learn language throughout life

Language Deprivation Profile

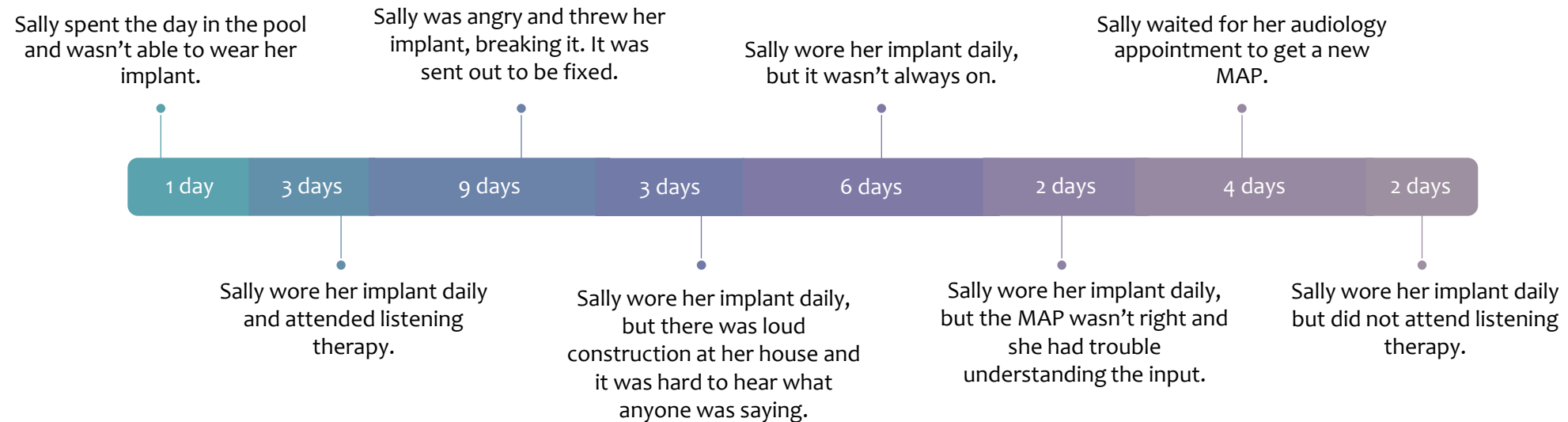
A day in the life of Jimmy, age 3



This totals at least 9 hours of **inconsistent to no** language input.

Language Deprivation Profile

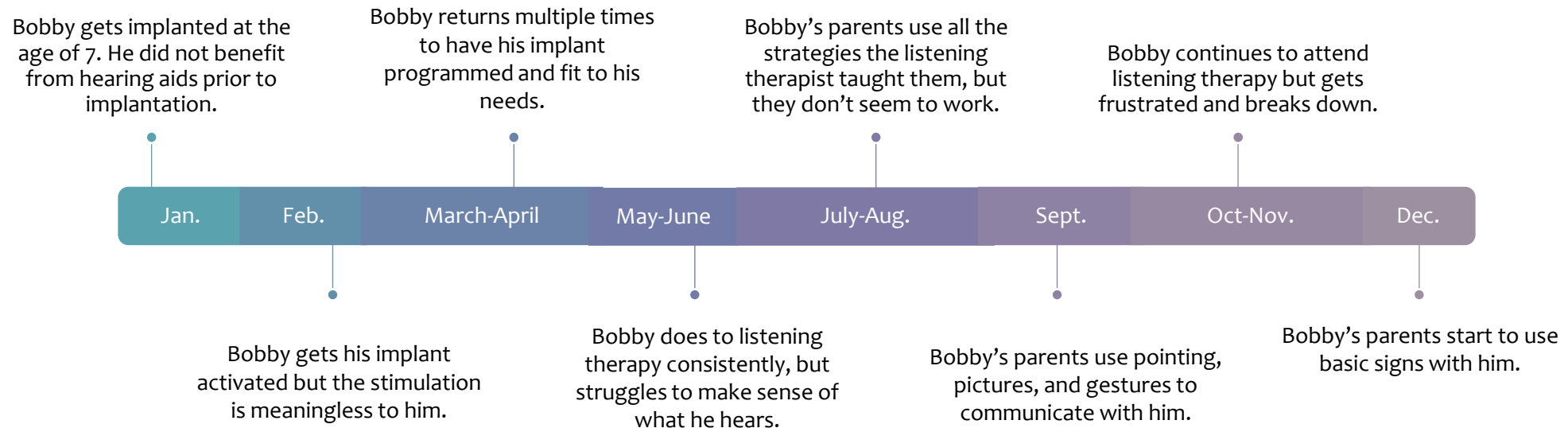
A month in the life of Sally, age 5



This totals at least 25 days of **inconsistent to no** language input.

Language Deprivation Profile

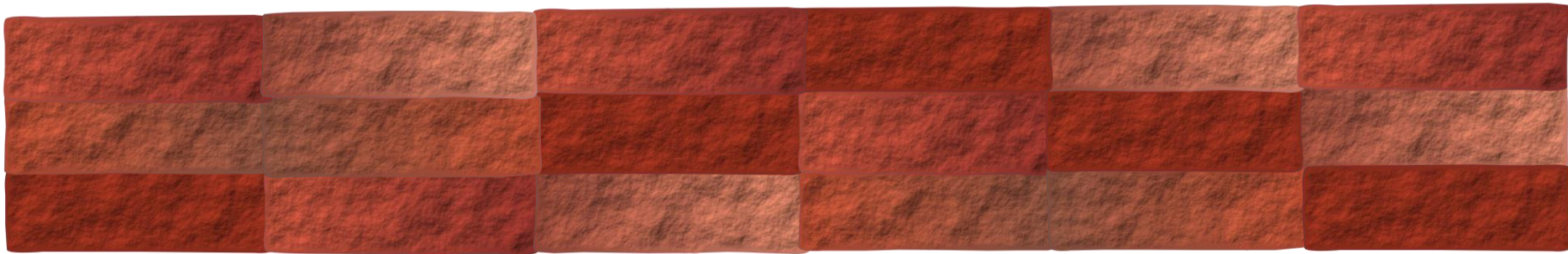
A year in the life of Bobby, age 7



This totals at least 8 years of **inconsistent to no** language input.

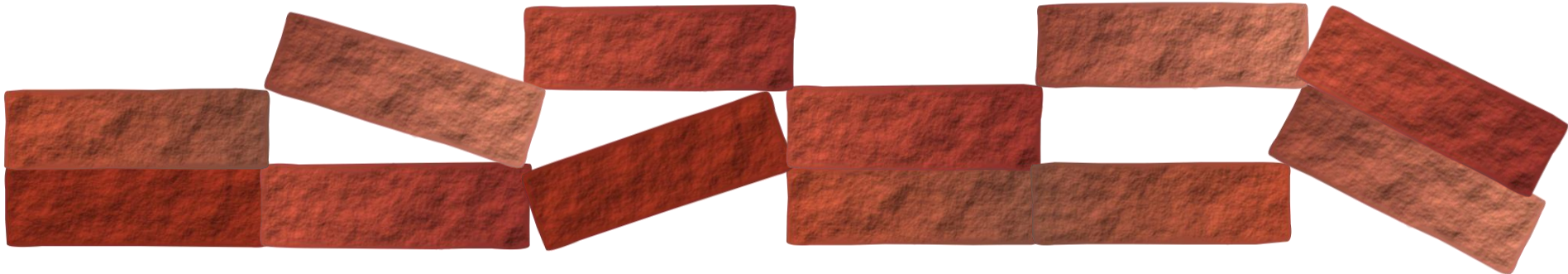
L1 Foundation

- A strong first language foundation allows for building cognition and other skills



L1 Foundation

- A weak or limited first language foundation impacts lifelong cognitive and language development
- Early language deprivation alters the microstructure of the left arcuate fasciculus (Cheng et al., 2019)



Principles of Language Deprivation

- It's not just a delay
- It's a spectrum (think of our case studies)
- Language must be made explicit
- Abstract concepts are difficult
- It doesn't just affect language

PRINCIPLES OF LANGUAGE DEPRIVATION

Five principles for understanding language deprivation.

- IT'S NOT JUST A DELAY**
Language deprivation is not simply a language delay. A delay implies that a child is behind but is on the right track and needs to catch up. A D/HH child with language deprivation has qualitatively different language abilities and is not following the typical developmental trajectory for language acquisition.
- IT'S A SPECTRUM**
Every D/HH child with language deprivation presents differently. Their language fluency falls along a spectrum, depending on the degree and duration of decreased early language access that they experienced.
- LANGUAGE MUST BE MADE EXPLICIT**
Because the D/HH child is outside of the critical period for language acquisition, they will not learn language through modeling alone. Even when given a fully accessible language, they will need to be explicitly taught the grammatical structures of that language.
- ABSTRACT CONCEPTS ARE DIFFICULT**
D/HH children with language deprivation do better understanding concrete, tangible concepts that can be directly experienced. They may struggle more with abstract concepts that cannot be concretely explained.
- IT DOESN'T JUST AFFECT LANGUAGE**
Because language is interwoven with cognition and has a rippling affect on everything else, children with language deprivation may also demonstrate difficulty with memory, executive functions, socioemotional skills, and academics.

WWW.LANGUAGE1ST.ORG

Signs and Symptoms

- Glickman (2007) highlighted the following symptoms:
 - Vocabulary is limited to concrete objects and actions and descriptions that have been directly experienced
 - Concepts of time, such as *yesterday*, *tomorrow*, *month*, and *year* are not reliably understood
 - Spatial organization is affected
 - Syntax is disordered and agrammatical
 - Signs are mixed with gesture and pantomime

SIGNS AND SYMPTOMS
OF LANGUAGE DEPRIVATION IN D/HH CHILDREN

COGNITION

EXECUTIVE FUNCTIONING
The child has difficulty with things like planning, problem solving, working memory, flexible thinking, and attention.

CONCEPTS OF TIME
The child has difficulty with things like verb tenses, sequencing, story-telling, adverbs of time, and telling time.

SPATIAL ORGANIZATION
The child has difficulty with things like prepositions, awareness of one's body in space, and visuospatial skills.

LANGUAGE

VOCABULARY
The child has difficulty learning concepts with abstract meaning or which have not been directly experienced.

SYNTAX
The child has difficulty putting words into a grammatical sentence in both natural and written language.

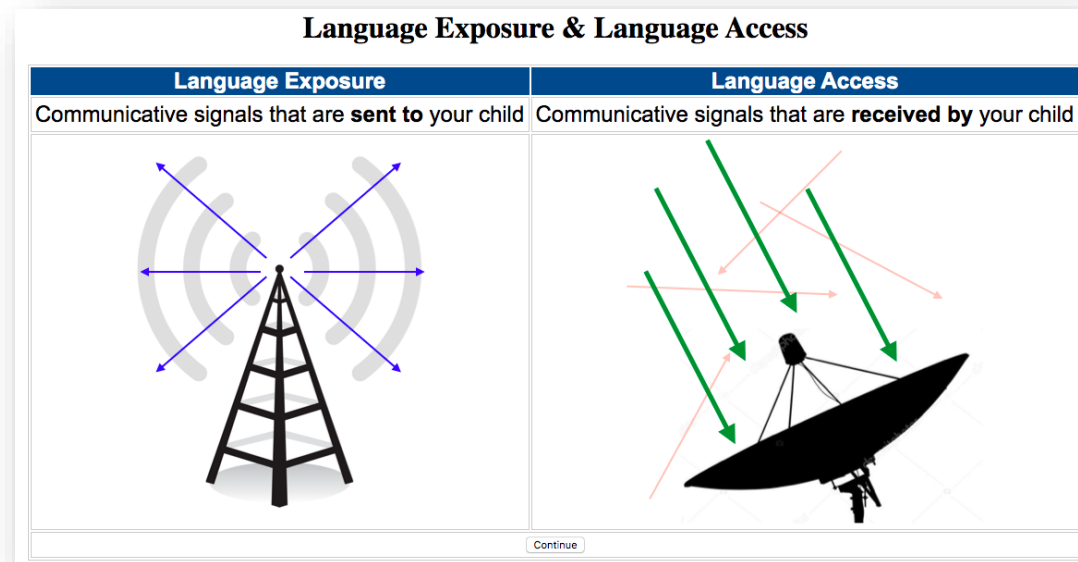
SO, A D/HH CHILD HAS THESE SIGNS OR SYMPTOMS. WHAT'S THE NEXT STEP?

If a D/HH child is demonstrating these signs and symptoms, it is critical to take action immediately. This is an urgent, time-sensitive issue that must be addressed through a team meeting, assessment, and a re-evaluation of the student's current placement and/or accommodations.

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Exposure vs. Access

- *Exposure* refers to the language stimuli being **sent** to the child while *access* refers to the language stimuli being **received** by the child
- In hearing children, being exposed to the language is usually enough



(Hall et al., in process)

LANGUAGE

exposure, access, and comprehension

EXPOSURE

WHAT IS LANGUAGE EXPOSURE?

Language exposure refers to the ambient language that is surrounding a child. If a child has exposure to a language, it means that language was being used by people all around the child.

ACCESS

WHAT IS LANGUAGE ACCESS?

Language access refers to the brain's ability to receive the language input. A Deaf child can have exposure to a spoken language with limited access. It's vital to ensure that the language is reaching the child's brain.

COMPREHENSION

WHAT IS LANGUAGE COMPREHENSION?

Language comprehension refers to the brain's ability to understand the language input. A child can have language exposure and language access with limited comprehension. It is vital to ensure that Deaf children has all three in order to develop a solid first language.

www.language1st.org

Exposure vs. Access

1 EXPOSURE

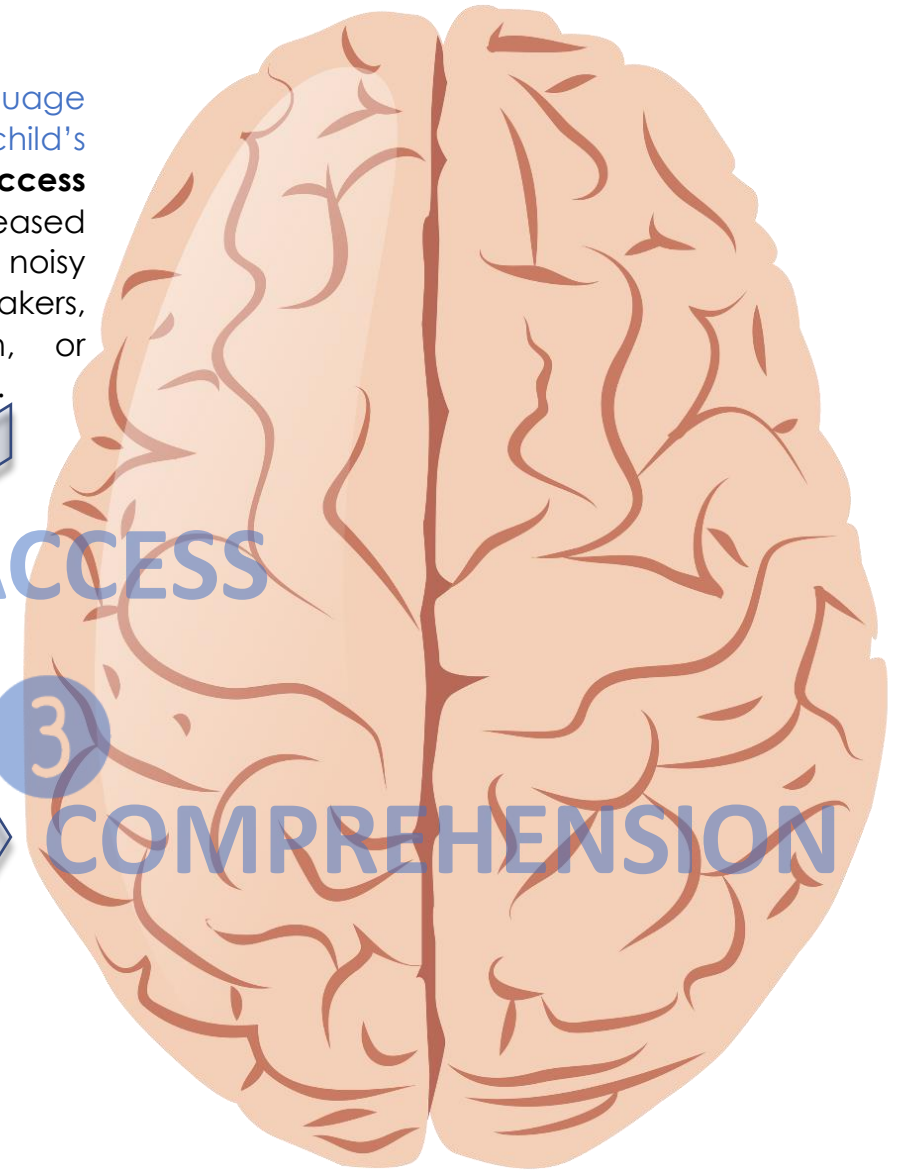
Exposure refers to the language that is all around the child. When a child's family, caregivers, and/or community speak a language, the child is **exposed** to that language.

Access refers to the language that is reaching the child's brain. In D/HH children, **access** to language is decreased whenever there is a noisy environment, multiple speakers, poor visual information, or when their devices are off.

2 ACCESS

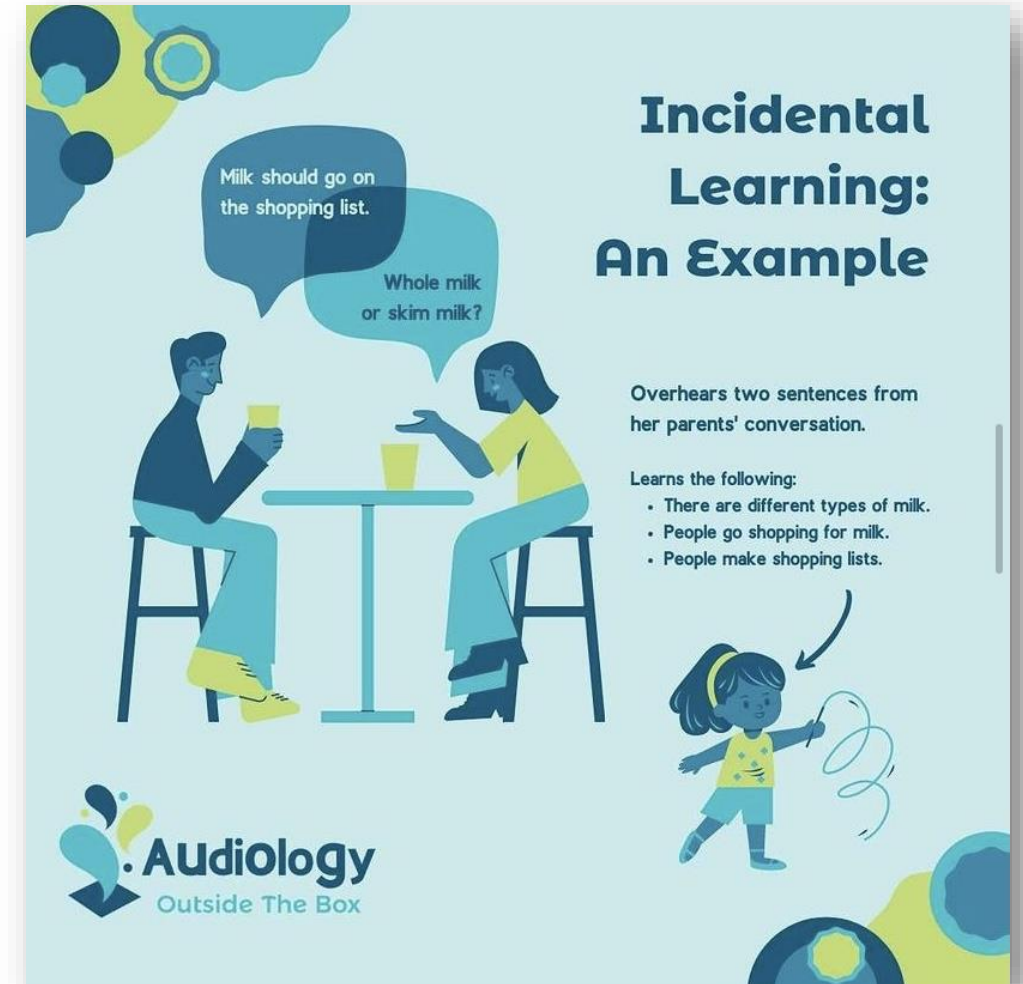
Comprehension refers to the language that is understood by the child. A child can have exposure and access to a language and still not **comprehend** it.

3 COMPREHENSION



How Do We Learn Words?

- Multiple, varied exposures over time
- Ex: ramekin
- Incidental learning constitutes a major portion of social development and world knowledge (King, 2017)



Incidental Learning: An Example

Overhears two sentences from her parents' conversation.

Learns the following:

- There are different types of milk.
- People go shopping for milk.
- People make shopping lists.

Audiology
Outside The Box

DHH Children

- Children with hearing devices are still at a very high risk for missing auditory information
 - Localizing sound
 - Hearing in background noise
 - Multiple speakers
 - No visuals
- Cumulative effect
- Ex: bull d



Language Acquisition as a Bank Account

Think about an infant's brain like a **bank account**.



LANGUAGE FIRST

Language input is like depositing money into their account.



LANGUAGE FIRST

It doesn't matter if you deposit the money via check (signed language) or wire transfer (oral language). It all gets deposited to the same account and **adds to the total value**.



LANGUAGE FIRST

But in Deaf children, the wire transfer (oral language) doesn't always deposit all of the money into their account. Sometimes only part of the money is deposited. **Sometimes, very little of it is deposited.**



LANGUAGE FIRST

Instead of focusing all your attention on the wire transfer, which continues to not work properly, **you could just deposit the money via check (signed language).**

LANGUAGE FIRST

The bank account doesn't care how the money is deposited. **If one method isn't working reliably, use another method.** Just get that money (language) into that bank account (brain).



LANGUAGE FIRST

Cross-Linguistic Transfer

- Chen Pichler et al. (2018):
 - Positive transfer from L1 to L2 will aid with the task of learning a new language through print
- Chamberlain & Mayberry (2008):
 - There is a reciprocal relationship between print exposure and sign language proficiency
 - Skilled reading was predicted by a combination of print exposure and sign language proficiency

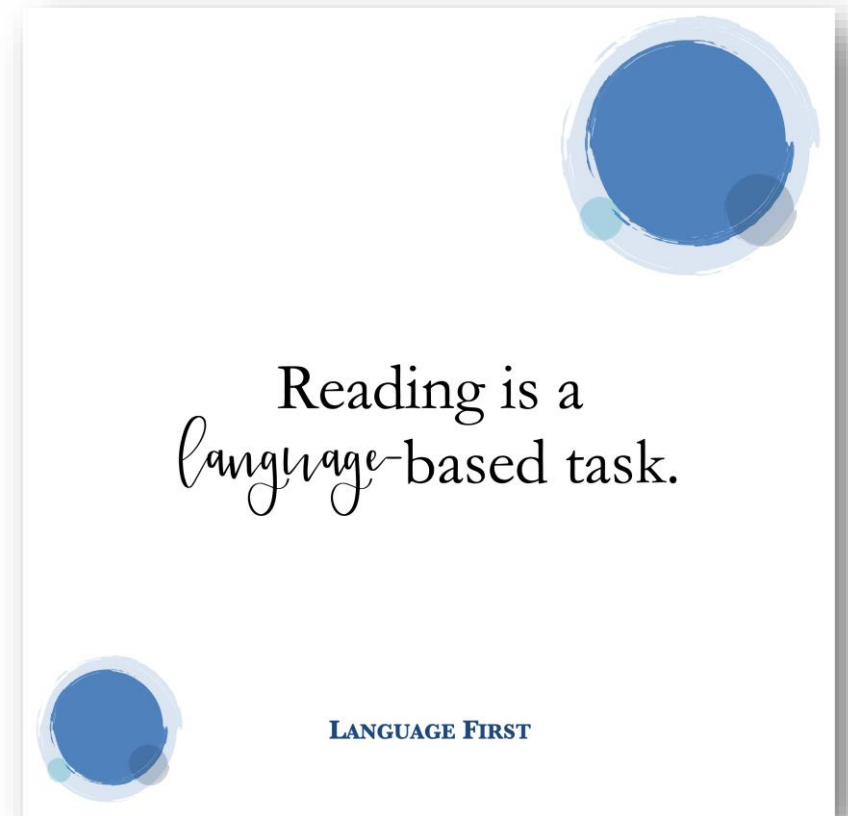
“

Our findings provide evidence that increased ASL ability supports English sentence comprehension both at the levels of the individual words and syntax”
(Andrew et al., 2014, p. 1).

LANGUAGE FIRST

Cross-Linguistic Transfer

- Knowing *any* language, even if it is not *the* language in print, appears to facilitate learning to read; indeed ASL may actually help deaf children learn to read English (Goldin-Meadow & Mayberry, 2001)
- Literacy is much more than just reading
 - It encompasses the acquisition of knowledge and the development of cognitive skills that one needs for thinking, comprehending, and communicating (Kuntze et al., 2014)



Hearing Parents of DHH Kids

LEVELS OF LANGUAGE PROFICIENCY

Parents of Deaf children who fall here are showing their child that they care and that they want to take on some of the communication burden so that it doesn't all fall on their child.

It is unfair to expect parents of Deaf children to fall here, *especially* if they began learning ASL in adulthood.

- Basic
- Conversant
- Proficient
- Fluent
- Native

LANGUAGE **FIRST**

Fluency is not the goal.
Connection is the goal.
Caring is the goal.

Removing burden is the goal.

LANGUAGE **FIRST**

Strategies for Reading

- https://youtu.be/_aJ8wj0p16A
- Relocate signs to child's visual field
- Exaggerate facial expressions
- Coordinate eye contact for joint attention
- Adjust your sign placement
 - Sign on toy, or on child
- Fingerspell (It's never too early to start!)

LANGUAGE STRATEGIES

Language is learned from the environment around us. Deaf children often miss out on language input when it is auditory-only. American Sign Language is a visual language that allows Deaf children full access to the linguistic input. Use these strategies to help increase a Deaf child's language in American Sign Language.

Sign Out Loud
Narrate everything you're doing and thinking in ASL. Because Deaf children do not have as much access to incidental learning, seeing someone signing as they go about a task is good language exposure.

Fingerspelling
Deaf children are never too young to fingerspell. Even if they are just moving their fingers to look like fingerspelling, they still are making the connection between letters, words, and signs. This directly relates to reading ability.

sandwich
If the child has some auditory access, use the sandwich method. Say something in ASL first, then in English, and then again in ASL. This will help make the connection between the two languages, with the more accessible language provided twice.

Sign On Body
Produce signs on the Deaf child's body. If the child is sitting in front of you, or even next to you, signing on the body can allow the child to be looking at an object while simultaneously receiving your language input.

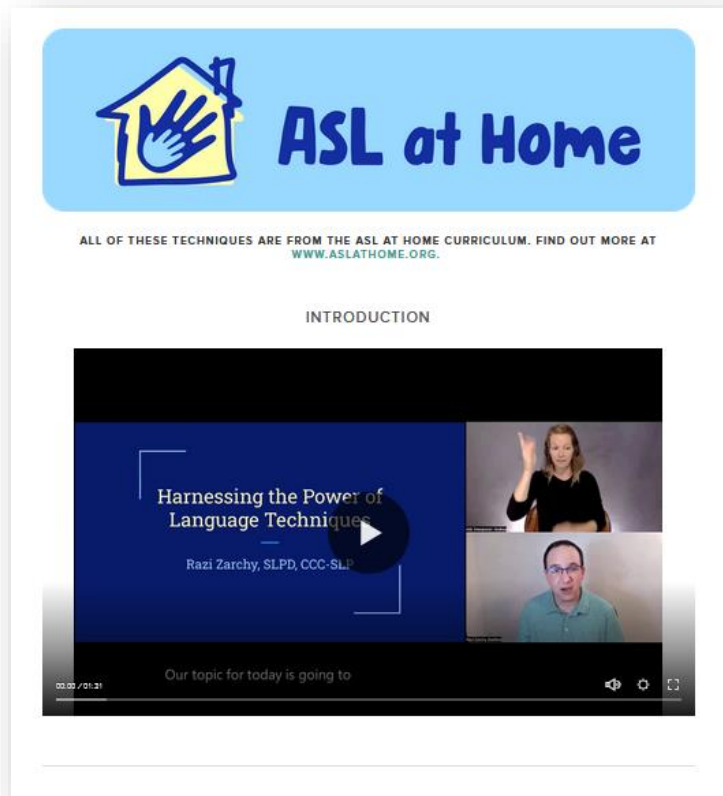
Eye Gaze
Make sure the Deaf child is looking at you when you're signing. If there is an item you're referencing, give the child time to look at the item and then look back at you before you start signing again.

Facial Expressions
Facial expressions are phonemic in ASL. This means that changing a small expression on your face can change the meaning of your message. Use exaggerated facial expressions with a Deaf child who is first learning how to sign.

Sign On Object
Similar to the concept of signing on a Deaf child's body, you can sign directly on objects. For example, if a teddy bear is "upset," sign on the bear itself. Or, if you're counting with the child, sign the numbers on the objects as you count.

Examples for Parents

- www.language1st.org/asl-support-page



ASL at Home

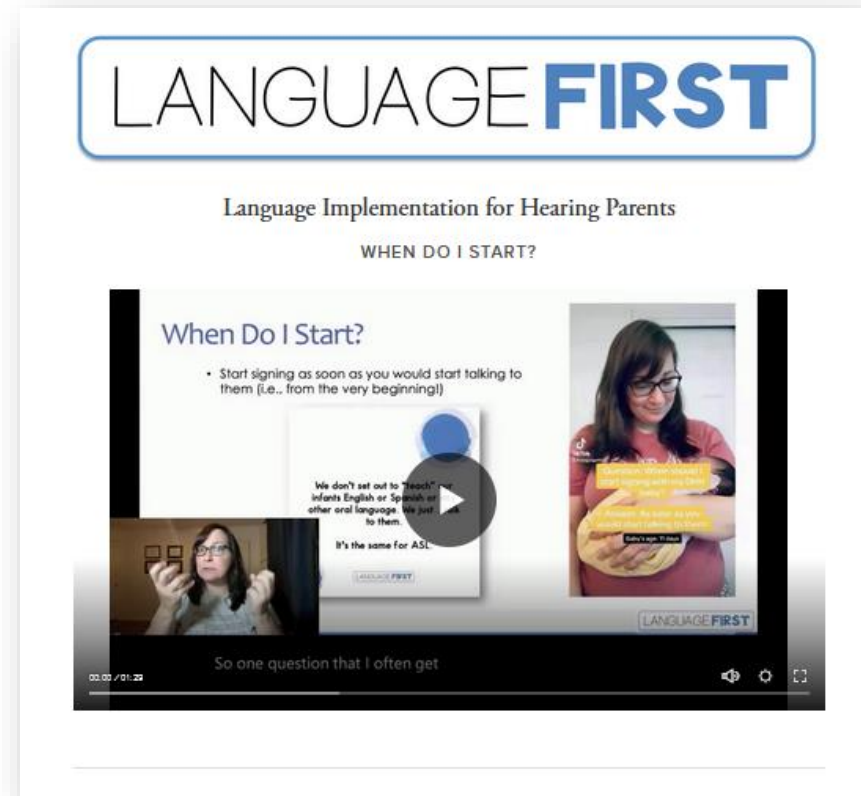
ALL OF THESE TECHNIQUES ARE FROM THE ASL AT HOME CURRICULUM. FIND OUT MORE AT WWW.ASLATHOME.ORG.

INTRODUCTION

Harnessing the Power of Language Techniques
Razi Zarchy, SLPD, CCC-SLP

00:00 / 01:21 Our topic for today is going to

This video player shows the title 'ASL at Home' with a logo of a hand inside a house. Below the title is a line of text stating that techniques are from the ASL at Home curriculum and providing a link to the website. The video content is an introduction by Razi Zarchy, SLPD, CCC-SLP, with a play button overlay. The video progress bar shows 00:00 / 01:21.



LANGUAGE FIRST

Language Implementation for Hearing Parents

WHEN DO I START?

When Do I Start?

- Start signing as soon as you would start talking to them (i.e., from the very beginning!)

We don't set out to "teach" our infants English or Spanish or other oral language. We just talk to them.

It's the same for ASL.

LANGUAGE FIRST

So one question that I often get

00:00 / 01:21

This video player features the 'LANGUAGE FIRST' logo at the top. The title is 'Language Implementation for Hearing Parents' with a subtitle 'WHEN DO I START?'. The video content includes a list item: 'Start signing as soon as you would start talking to them (i.e., from the very beginning!)'. It also contains text explaining that the goal is not to 'teach' oral language but to talk to the child. A play button is overlaid on the video. The video progress bar shows 00:00 / 01:21.

Resources

- [List of Pro-ASL professionals](#)
- [Children's books with deaf characters](#)
- [Free handouts](#)
- [When and Why Parents Learn Sign Language](#)

Questions?

- kimberly@language1st.org
- www.language1st.org

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