Speech and Language Outcomes for Children in Auditory-Verbal Therapy Programs: A Review of Current Research and Future Directions

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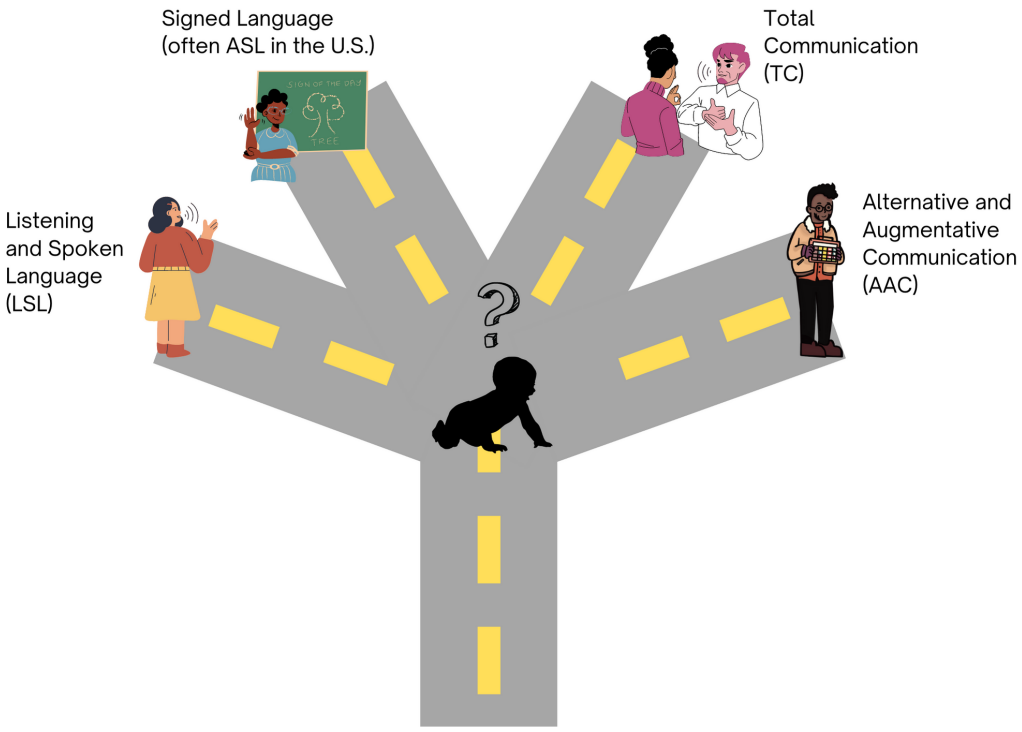
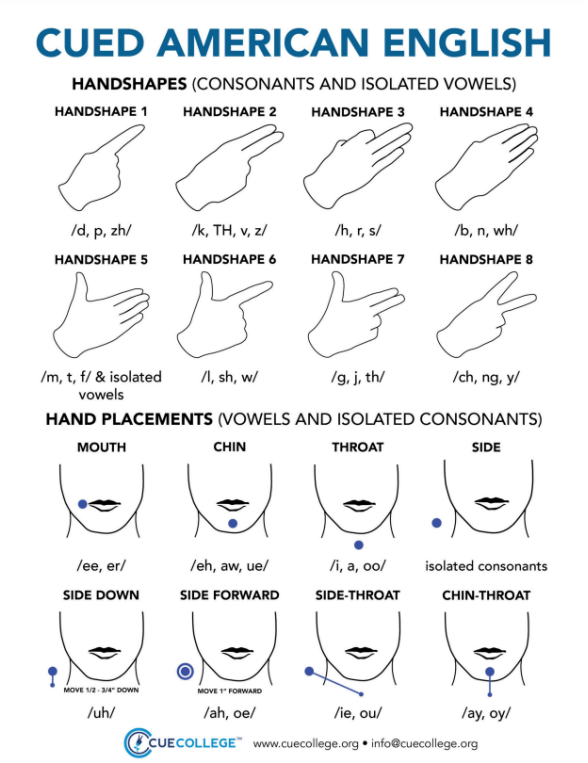
Most typically-developing children follow a similar path to develop oral communication: in infancy, listening to language progresses to babbling which becomes first words and eventually using adult-like sentences. This path requires *auditory access*: children must be able to *hear* language to begin the development of spoken language (Marschark et al., 2010).

Children with hearing loss, however, have multiple different paths available to them to learn language. Each path will lead to communication, but the journey may look slightly different. One path is listening and spoken language (LSL), one path is signed language (often American Sign Language in the United States), one path is a combination of the two (Total Communication), and one path is neither, commonly called Alternative and Augmentative Communication (AAC).



On the LSL path, children's ability to hear oral language is amplified, most commonly through hearing aids (HAs) or cochlear implants (CIs). While these devices improve access to sound and speech, they do not completely restore hearing. Studies

show that children must be taught to use these devices and train themselves to recognize the output to be able to learn language from them (Rayes et al., 2019). For example, Ingvalson et al., 2014 compared the language performance of children aged 4-7 with cochlear implants when given auditory training versus when they don't receive any specific auditory training. A group of 10 children with CIs received phonological and working memory training while 9 children with CIs continued their normal classroom activities over four weeks. The children who received the auditory training showed significant improvement in both expressive and receptive language as compared to the children who didn't receive the training.



One commonly-used therapy for a LSL goal is *auditory-oral therapy* (AOT). This approach allows children access to spoken language, but it uses other sensory cues to help children identify sounds. These cues could be natural visual cues, such as the body language and gestures used in everyday speech, or the cues could be more intentional, such as in cued speech when speakers use hand gestures to differentiate between similar sounds.

More recently, therapists, teachers, and caregivers have embraced *auditory-verbal therapy* (AVT), an approach to learning spoken language that relies only on the child's available auditory input (Estabrooks et al., 2020). Caregivers and therapists who use AVT do not rely on gestures or other visual cues to focus a child's attention or to help the child decipher the sounds or words that they are hearing. The practice was defined nationally in 2007 when the Alexander Graham Bell Association for Deaf and Hard of Hearing published 10 principles of AVT (Estabrooks, 1994). Preliminary studies (2000-2015) celebrated this approach, finding much higher rates of language development (the child's overall language score divided by their age) and better speech outcomes than with other therapies (Kaipa & Danser, 2016).

Kaipa and Danser performed a comprehensive review of the research on AVT efficacy for spoken language outcomes produced between 1993 and 2015 (14 studies). One of the first of these studies, Rhoades & Chisholm (2000), enrolled 40 children (4-100 months old; mean age: 44 months) with hearing loss (using HAs or CIs) in AVT programs and looked at their language outcomes after four years. They found that these children showed drastic improvement in both receptive and expressive language and essentially attained the same linguistic level as their hearing peers. Other studies, such

as Dornan et al. (2009) studied a similar cohort of children with hearing loss (25 children aged 2 months to 6 years; mean age: 2.11 years) and looked at speech outcomes as well as the language effects already mentioned. They found an identical effect: after 21 months in the AVT program, children had significantly improved their oral expression and articulation of consonants to a point where it was comparable with the comparison group of children with typical hearing.

This pattern continued throughout the early 21st century. Other studies found similar dramatic improvement with children as old as 17 years old (Fairgray et al., 2010) and with AVT programs lasting as little as 9 months (Dornan et al., 2007). Overall, it seemed that AVT programs were tested out in various combinations of age ranges, levels of hearing loss, and time spans, but they all had positive outcomes. Not a single study in Kaipa and Danser's scoping review had a negative outcome for children with hearing loss enrolled in AVT programs in terms of their listening and spoken language abilities. Furthermore, recent studies comparing different intervention approaches to LSL have generally found that AVT programs produce better speech, language, and literacy outcomes as compared to both AOT and Total Communication programs (Thomas & Zwolan, 2019).

However, these studies had some limitations. One such limitation was in experimental design. None of the studies that Kaipa and Danser reviewed were true experiments. For a study on AVT to be a true experiment, the researchers would need to have some of the children with hearing loss purposefully *not* receive any therapy to see if the AVT was helping by comparison. Such intentional withholding of care would be unethical. Thus, this is an inherent limitation in studies on AVT. Future research will also run into this issue, and the efficacy of AVT for children with hearing loss over receiving no therapy may never truly be understood.

Another limitation brought up in Kaipa & Danser (2016) was that there are many different ways to implement AVT. The AVT programs that Kaipa & Danser reviewed were not all the same. At its core, AVT is defined by its singular focus on using hearing—and only hearing—to help children develop LSL. In AVT, signing or using other methods of communication to supplement a child's understanding of what they are hearing takes their focus away from developing speech perception through hearing. AVT, in theory, intensifies this process by removing any outside sensory help (Estabrooks et al., 2020).

Nevertheless, many AVT programs and therapists use some facial and/or manual communication methods for children with additional needs (Eriks-Brophy, 2004). Additionally, there are few specific, federal guidelines for AVT beyond the original 10 principles published by AG Bell in 2007 (Estabrooks, 1994). Auditory-Verbal Therapists may have very different practices, and the studies determining the efficacy of AVT as a whole treat the practice as if it were uniform.

Additionally, the studies included in Kaipa and Danser's 2016 review tended to include participants with hearing loss who had either higher-than-average receptive and

expressive language skills, or a high language development rate to begin with. It may not be surprising that the children who benefit the most from AVT may be the ones with better language skills in the first place. Some studies included a more homogeneous group of participants with a higher language development rate (Dornan et al., 2007, 2009, 2010), while others included participants with additional difficulties, including sensory-integration difficulties and attentional deficits (Rhodes & Chisholm, 2000; Hogan et al., 2008; Hogan et al., 2010). At the time of this review, the authors concluded that more studies would be needed to determine if AVT was effective for children with hearing loss with additional needs rather than just a select group of AVT "stars."

However, Kaipa & Danser (2016) did find some notable outcomes of AVT from the studies despite the aforementioned limitations. Neither socioeconomic status nor child age seems to impact AVT efficacy. This suggests that people who aren't able to access early hearing intervention for their child (which is often an advantage of having a high socioeconomic status) may still see large LSL benefits from AVT.

The benefit that these families experience may result from the intensity of the therapy. In one study, children who started receiving AVT after three years of age were able to catch up to their hearing peers' spoken language skills (Rhodes & Chisolm, 2000). It is unknown whether the intensity of the therapy program or the actual mechanism of focusing solely on listening result in such strong listening and spoken language outcomes for children with hearing loss.

Overall, Kaipa & Danser (2016) found moderate evidence that AVT benefitted receptive and expressive language skills, weak evidence that AVT benefitted speech perception, and little evidence that AVT helped children with hearing loss succeed in mainstream schools. These shortcomings opened up the field for more research to be done on AVT efficacy, and more recent studies seemed to confirm, as well as question, some of the previous assumptions.

A more recent review of 16 AVT studies for children with hearing loss (Ganek & Cardy, 2021) compared AVT to other speech and language interventions. All of the reviewed studies included agree with those in Kaipa & Danser (2016) that any intervention for listening and spoken language done before three years of age will produce higher speech and language outcomes than interventions done after three years of age. However, these studies found conflicting results.

Percy-Smith et al. (2017) enrolled 94 children with CIs in speech and language intervention not specifically designed for deaf/hard-of-hearing children and 36 children with CIs in AVT. The children in AVT significantly outperformed the children in the nonspecific interventions in a number of areas: AVT had a very large beneficial effect on language skills and vocabulary size, and a moderately beneficial effect on speech outcomes as compared to the nonspecific intervention.

But when AVT is compared to other specific speech and language interventions, its benefits become less clear. Yanbay et al. (2014) compared speech and language

outcomes for 42 children with CIs (implanted before 3 years of age) who were enrolled in three different intervention programs: 1) signed and spoken language (total communication or TC), 2) Auditory-Oral Therapy (AOT), and 3) AVT. AOT uses manual gestures and/or visual cues to support children's understanding of auditory information. In contrast to the nonspecific intervention in Percy-Smith et al. (2017), Yanbay et al. (2014) found no significant difference between speech and language outcomes for children in the AVT program compared to children in the TC and AOT programs. Dettman et al. (2013) found that AOT programs led to better speech and language outcomes over both AVT and Bilingual-Bicultural (using ASL as a first language and English as a second) approaches. These conflicting results suggest that interventions specifically geared towards children with hearing loss may offer benefits over traditional speech-language intervention because they offer additional points of access to language (whether that is the addition of signing, visual gestures/cues, or intense listening training). However, there may not be a significant benefit of one point of access over the other. Any access to language may help, and individual children may benefit differently from each kind of intervention.

More studies have been done to investigate which kind of intervention, if any, is most effective with children with hearing loss. Thomas & Zwolan (2019) did a similar study to Yanbay et al. (2014) and investigated speech and language outcomes for children with CIs in AVT, AOC, and TC programs. Unlike Yanbay et al., the researchers found that children in AVT programs had improved receptive and expressive language skills, reading comprehension skills, and speech intelligibility scores compared to children in the two other programs. One notable difference between the studies is that the participants in Yanbay et al. (2014) were all implanted before 3 years of age while the participants in Thomas & Zwolan (2019) were all implanted before 5 years of age. Perhaps children who are implanted later (after three years of age) benefit more from AVT as compared to AOT or TC while children who are implanted before three years of age can get the same benefits from all of the approaches. This idea coincides with the evidence from Rhodes & Chisholm (2000) that AVT is particularly effective for children implanted after three years of age due to the intensity of the therapy. However, as noted earlier, AVT is widely variable, and until more stringent guidelines are put in place to define the therapeutic measures, it is unknown whether or not these results would be repeated across different AVT programs nationwide.

In addition to AVT's potential benefit over other therapies, Kaipa & Danser (2016) originally asked whether AVT benefitted children with additional difficulties, or if the approach was most effective for children with well-developed language skills.

Hitchens & Hogan (2018) investigated this question with preschool-aged children with CIs who also had additional needs including developmental delays, sensory motor difficulties, Down's syndrome, and speech and language disorders. Their findings suggest that preschool children with CIs and additional needs benefit from AVT, although not to the extent that children with CIs *without* additional needs do.

Additionally, this study did not differentiate between types of additional need (sensory motor difficulty, Down's syndrome, etc.) when drawing this conclusion. It is likely that children with communication disorders benefit less from AVT than children without communication disorders. More studies should be conducted to investigate the efficacy of AVT with each of these groups of children to determine best practices.

Some of these questions point to some future research directions for AVT. With the COVID-19 pandemic, teletherapy became a standard of care for families in both rural and urban areas of the United States. Yet it is unknown if virtual AVT is as effective as in-person AVT. Some studies have been investigating this question and have found that there are few differences between in-person and virtual AVT delivery on children's language, vocabulary, and auditory skill outcomes; virtual delivery may even be more advantageous than in-person for expressive language outcomes (Chen & Liu, 2017; Constantinescu et al., 2014; Behl et al., 2017). None of these preliminary results show any negative effects of virtual AVT delivery on any speech-language outcomes.

Additionally, with the expansion and solidification of the Deaf community all over the world, much more attention has been paid to the multicultural influences on spoken language for Deaf children and how it adapts AVT. Both culture and socioeconomic status have been shown to impact children's language development (Hart & Risley, 1995; Ochs & Schieffelin, 2016). One study looked at the efficacy of AVT in a Persian AVT program, and found positive outcomes for expressive and receptive language skills when vocabulary drills were added to the therapy (Monshizadeh et al., 2016). Cultural and linguistic influence may influence how AVT is practiced and how children learn language from it.

With the embrace of Total Communication and inclusive classrooms, children nowadays are exposed to many different communication techniques and may use a combination of a few different ones. Research comparing AVT with other therapy approaches has yet to consider possible synergistic effects from using a combined approach.

Despite research spanning several decades, it's still hard to determine if AVT offers more benefit for listening and spoken language outcomes than AOT or TC. However, one can identify some concepts from all these approaches that, combined, could create a more effective therapy than any one approach in isolation. Many of the previously-mentioned AVT studies included a caveat that some auditory-verbal therapists gave certain students some visual support (signing) during AVT (Kaipa & Danser, 2016; Ganek & Cardy, 2021). The diversity of practice with consistent results from AVT suggests that the approach's strength may not come from the lack of visual cues. Instead, it may come from the care and attention given to learning to listen.

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