# CASE STUDY

# Using AVAZ to Enhance Communicative Abilities of a Child with Cerebral Palsy

Sita Sreekumar*


## *ABSTRACT*

*Communication difficulties associated with cerebral palsy can be multifactorial, arising from motor, intellectual and / or sensory impairments. Affected children can experience mild to severe difficulties in expression. Those with little or no functional speech frequently rely on non-speech communication systems to augment or replace natural speech. These systems include speech generating devices (SGDs). AVAZ is a portable speech synthesizer which can be controlled by the gross motor movements of a child with cerebral palsy.*

***Purpose:*** *This case study describes the outcomes of a pilot investigation that utilised AVAZ as a means of enhancing functional communication in a young girl with cerebral palsy.*

***Method:*** *A 7-year-old girl with cerebral palsy and complex communication needs was trained for 10 sessions to develop requesting ability by pointing to the desired pictures on the AVAZ.*

***Results:*** *After the training sessions, the child showed improvement in social interaction and functional communication.*

***Conclusions and Implication:*** *The collaborative efforts of an interdisciplinary team, comprising a speech pathologist, a physiotherapist, parents of the child and a social worker, made it possible to enhance the child's confidence and functional communication using AVAZ.*

*Hence it is important to pursue client-oriented, innovative and collaborative intervention approaches among team members.*


***Key words:*** *Cerebral palsy, complex communication need, speech generating device, functional communication.*

* **Corresponding Author:** Audiologist & Speech Language Pathologist, Department of Audiology and Speech Language Pathology, National Institute of Speech and Hearing, India. Email: sitas@nish.ac.in

# INTRODUCTION

Communication is defined in the broadest sense as "any act by which one person gives to or receives from another person information about that person's needs, desires, perceptions, knowledge, or affective states" (National Joint Committee {NJC}, 1992). Children, who are unable to speak, face social and educational isolation as well as frustration because they are not able to communicate their needs, desires, knowledge and emotions. Cerebral palsy is one among the various neurological impairments that impede speech and language development.

Cerebral palsy is a "persistent disorder of movement and posture caused by non-progressive pathological processes of the immature brain" (Aicardi & Bax, 1992) that is acquired before or during birth, or in infancy. It is estimated that 20% of children diagnosed with cerebral palsy have severe communication impairments (Pennington et al, 2005). The communication difficulties associated with cerebral palsy could be multifactorial, arising due to motor, intellectual and / or sensory impairments of the child. Children with cerebral palsy often seek help from Speech Language Pathologists to improve speech, language and feeding skills. When the communication impairment is severe however, intervention aimed at improving speech and language skills may be ineffective. For such children, the focus of intervention is functional communication.

Augmentative and Alternative Communication (AAC) is an area of assistive technology that "attempts to compensate (either temporarily or permanently) for the impairment and disability patterns of individuals with severe expressive communication disorders (i.e., the severely speech-language and writing impaired)" (American Speech-Language-Hearing Association, 1989). It is an inclusive term for any system that facilitates communication, which can include strategies, techniques, and/or devices that support an individual's expressive communication. The use of AAC has been found to have important benefits for children with complex communication needs (Blackstone, 1993, 2008, 2009).

Speech-generating devices (SGDs) are increasingly being used as augmentative and alternative communication options for individuals with developmental disabilities who have limited or no spoken language (Scholosser & Blischak, 2001; Mirenda, 2003; Sigafoos et al, 2003; Lancioni et al, 2007). SGDs typically consist of a computer-based processing unit with a visual display. The visual display might hold a number of vocabulary items (e.g., photographs, line drawings, or printed words). The devices are programmed to produce digitised (i.e., recorded) or synthesised speech output corresponding to each vocabulary item.

AVAZ is a commercially available portable SGD in India. AVAZ uses picture symbols and high-quality voice synthesis to help users create messages and develop language skills. It also incorporates a powerful keyboard to help users transition to text. It is important to promote evidence-based practice about the successful use of such AAC systems so that the effectiveness of new and established interventions can be documented and used to counsel parents and increase acceptability by families.

This case study describes the outcomes of a pilot investigation that utilised AVAZ as a means of enhancing functional communication in a young girl with cerebral palsy.

# METHOD

## Case Summary

A 7-year-old girl with spastic quadriplegic cerebral palsy was brought by her parents who reported that she had inadequate speech output and communication through vocalisations and facial expressions. No significant family history was revealed. The medical history included pre-natal maternal hypothyroidism; hence the mother was under medication. The premature child, weighing 1.25 kg at birth, was delivered in breech position. Soon after birth the child had jaundice and hypoxia, and developed episodic convulsions when she was 2 years old. Along with severe gross and fine motor dysfunction, developmental milestones such as speech and language development were delayed. The child uttered her first word only at 2 years of age. The results of speech, language and motor characteristics are summarised in Table 1.

## Pre-therapy Evaluations

To evaluate the child's current level of communication, a pre-therapy evaluation was carried out using the Communication Matrix. This assessment tool, published by Dr. Charity Rowland (Rowland, 2011), is designed to document how children with severe or multiple disabilities communicate, and provides a framework for determining logical communication goals. The Communication Matrix involves 3 aspects of communication: the behaviour used to communicate, the message that is expressed, and the level of communication. The Matrix is also organised

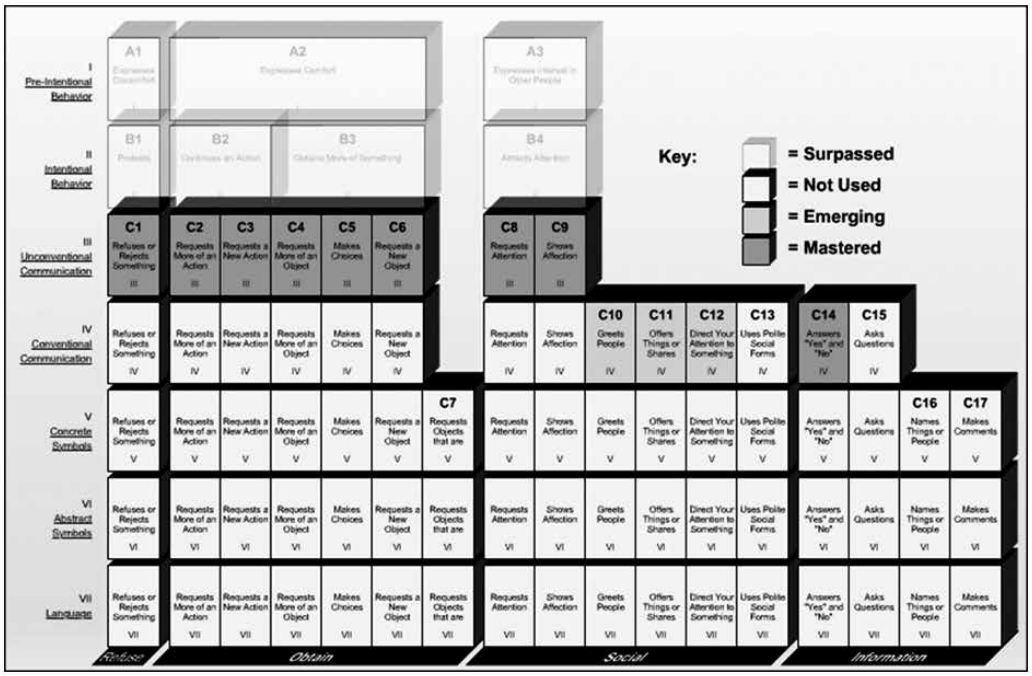
**Table 1: Speech, Language and Motor Characteristics**

| Speech & Language Skill | Description |
|---|---|
| Vegetative Skills | Sucking, chewing, biting, swallowing, biting, blowing affected and drooling present |
| Reflexes | No pathological reflexes present |
| Oral Mechanism Evaluation | Open mouth posture, structures such as lips, teeth, tongue, hard palate, soft palate normal in appearance but range and rate of movements affected |
| Respiratory Pattern | Abdominal |
| Communication Behaviour | Mostly nonverbal and verbal. Expressive vocabulary of about 5 words, uttered meaningfully |
| Receptive & Expressive Language Skills | REELS: RLA: 24-27 months & ELA: 12-14 months |
| Motor Skills | Description |
| Motor Behaviour | Hypertonia |
| Muscle Control | Inadequate |
| Muscle Power | 1, flicker to contraction |
| Mode of Ambulation | Non-ambulatory |
| Coordination | Grasping present but motor coordination affected |
| Modified Ashworth Scale revealed score | +1 implies slight increase in muscle tone, manifested by catch, followed by minimal resistance throughout the remainder (less than half) of the ROM. |
| Gross Motor Function Classification System | Level 5 implies transported in a manual wheelchair |

into 4 reasons to communicate which are: to refuse things; to obtain things; to engage in social interaction; and to provide or seek information.This information is recorded in a profile which would depict whether a skill is mastered, emerging, not used or surpassed for the level of communication behaviour across the 4 reasons. Figure 1 depicts the pre-therapy Communication Matrix profile of the child.

Based on the pre-therapy evaluation, short-term goals were set for 10 sessions. Short-term goals focussed on the following: to improve pointing skill, eye-hand coordination, and communication acts using AVAZ such as requesting a desired object, greeting, and response to questions.

**Figure 1: Pre-therapy Communication Matrix Profile**



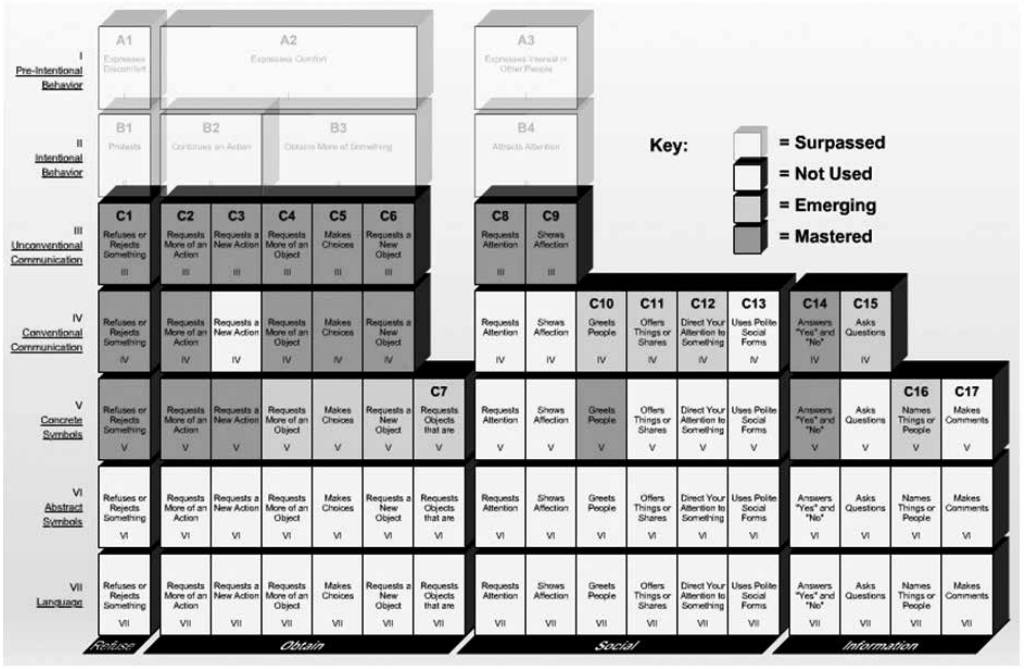

## Therapy Details

The child attended 10 sessions of regular speech therapy and 5 sessions of physiotherapy, each of 1-hour duration. Speech therapy sessions started with identifying the child's likes and dislikes. Due to spasticity and poor fine motor control, the picture size chosen was extra-large, i.e., 2 pictures being displayed on the AVAZ screen. A separate folder was created in the AVAZ with the child's needs, likes and dislikes. The folder contained sub-sections with appropriate pictures -namely greetings, requesting, about me, answering questions - and the child was trained to use AVAZ and point to the appropriate pictures according to the given command. Daily lesson plans were undertaken with specific activities for each goal. After every session, home-training activities were explained to the accompanying caregiver.

## Post-therapy Assessment

To assess the child's progress, the Communication Matrix was re-administered after 10 sessions of speech therapy. Figure 2 depicts the post-therapy Communication Matrix profile.

**Figure 2: Post-therapy Communication Matrix Profile**




## RESULTS and DISCUSSION

Post-therapeutic assessments revealed an improvement in the communication abilities of the child, as seen in Figure 2. Pre-therapy and post-therapy comparisons of the Communication Matrix profile showed that the child had shifted from intentional but unconventional communication usage to more conventional and symbolic communication across all the 4 reasons to communicate. The child improved in pointing and eye-hand coordination skills, she could point to the appropriate pictures on command and for requesting, though sometimes the pointing was off-target which could be attributed to the motor impairment. Also, the child displayed more confidence and showed increased communication intention. However the use of AVAZ could not be generalised as the device was employed only during the therapy sessions.

## CONCLUSION

This case study shows that the child exhibited improvement not only in functional communication but also in communication intention. Hence AVAZ can be used as

an effective tool for communication among children with complex communication needs and problems in gross motor functions. Evidence-based practice in terms of documenting and reporting the improvements in communication is essential, as this paves the way to successful counselling and greater acceptability among families. Also, an interdisciplinary team comprising speech pathologists, physiotherapists, parents and social workers, should collaborate to achieve progress. The implication of this case study is the importance of client-oriented, innovative and collaborative intervention approaches among team members.

## ACKNOWLEDGMENT

The author is very grateful to the child subject and her parents for their cooperation during this study. She would also like to thank Haritha S Mohan for her intensive therapy.

## REFERENCES

Aicardi and Bax (1992). Cerebral palsy definition. Available from http://www.southernchildrensphysiotherapy.com/cerebral-palsy.html. Accessed on 1 September 2013.

American Speech Language-Hearing Association (1989).What is AAC. Alternative and Augmentative Communication Handbook. Available from: https://docs.google.com/a/nish.ac.in/document/d/16vEWS8KrQiHvC8hPzzl8J1clZxBZX8cllrmhrp1jlXk/edit. Accessed on 1 August 2013.

Blackstone S (1993). Reflections of AAC users on their Adolescence. Augmentative Communication News; 6 (3): 1-2. Available from: http://www.augcominc.com/newsletters/index.cfm/newsletter_102.pdf

Blackstone S (2008). Principles for classrooms with students who use AAC. Augmentative Communication News; 20 (4): 1-2. Available from: http://www.augcominc.com/newsletters/index.cfm/newsletter_50.pdf

Blackstone, S. (2009). Communication and technology. Augmentative Communication News; 21 (3): 1-2. Available from: http://www.augcominc.com/newsletters/index.cfm/newsletter_130.pdf

Lancioni GE, O'Reily MF, Cuvo AJ, Singh NN, Sigafoos J, Didden R (2007). PECS and VOCA to enable students with developmental disabilities to make requests: An overview of the literature. Research in Developmental Disabilities; 28: 468-488. http://dx.doi.org/10.1016/j.ridd.2006.06.003. PMid:16887326

Mirenda P (2003). Towards functional augmentative and alternative communication for students with autism: manual signs, graphic symbols, and voice output communication aids. American Speech-Language-Hearing Association; 34: 203–216.

National Joint Committee (NJC) for the communicative needs of persons with severe disabilities (1992). Definition of Communication. Available from: http://www.unm.edu/~devalenz/handouts/defcomm.html

Pennington L (2008). Cerebral palsy and communication. Journal of Paediatrics; 18 (9): 405-409. Available from: http://www.paediatricsandchildhealthjournal.co.uk/article/S1751-7222%2808%2900130-3/abstract

Pennington L, Goldbart J, Marshall J (2005). Speech and language therapy to improve the communication skills of children with cerebral palsy (Review). Available from: http://www.cckm.ca/CPSLPR/pdf/Pennington2003.pdf. Accessed on 1 October 2013.

Romski MA, Sevcik RA (2005). Augmentative communication and early intervention myths and realities. Infants & Young Children; 18 (3): 174–185. http://dx.doi.org/10.1097/00001163-200507000-00002

Rowland C (2011). Online communication matrix. Available from: http://www.communicationmatrix.org/uploads/pdfs/handbook.pdf

Scholosser RW, Blischak DM (2001). Is there a role for speech output in interventions for persons with autism? A review. Focus on Autism and Other Developmental Disabilities; 16: 170-178. http://dx.doi.org/10.1177/108835760101600305

Sigafoos J, Diden R, O'Reilly M (2003). Effects of speech output on maintenance of requesting and frequency of vocalizations in three children with developmental disabilities. Augmentative and Alternative Communication; 19: 37-47. http://dx.doi.org/10.1080/0743461032000056487