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ASHA KIRAN A Biannual Newsletter of the Asian Indian Caucus

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From the President's Desk

Hi everyone! Believe it or not, the time has come for me to write my farewell message as the President of the Asian-Indian Caucus of ASHA. I have been extremely fortunate to witness a time of substantial positive change for our caucus during my tenure. I have also derived real personal and professional fulfillment from my role in leading this caucus. Undoubtedly, a part of me will sorely miss being part of the momentum and energy that comes from being involved at the grassroots level in an organization. Yet the lifeblood of any organization is innovation in ideas, approaches, and solutions to problems. This innovation can only be ensured with new leaders and fresh minds, or we risk losing the vigor that sustains organizations.

With this thought in mind, I want to extend my sincere thanks to all of you for this opportunity to serve as the President of the Asian-Indian Caucus. I have been humbled by your trust in my abilities and appreciate your cooperation and support in working on AIC goals. I will treasure the fond memories of AIC and join other past presidents, continuing to serve in an advisory capacity as needed by the incoming Executive Board. I would like to especially acknowledge Shubha Kashinath, Swathi Kiran, Megha Sundara, & Bopanna Balachanda for their untiring efforts during my tenure! Gracias!

As my final request to all members and affiliates, I urge you to get actively involved with AIC in any capacity, revisit any past decisions to not be involved, and cooperate fully with the new leadership of the AIC. We need your participation in staffing the AIC booth in the exhibit hall at ASHA 2003 and look forward to seeing you at the annual AIC meeting on Thursday, November 13th in Chicago. In my last few weeks on the executive board, I welcome your ideas, comments or any feedback. I can be reached via email at nidhi@email.arizona.edu. Have a safe travel to Chicago and we'll see you there!

Nidhi Mahendra, PhD, CCC-SLP

AIC Booth at the convention: Drop in November 13-15 between 10 am to 6 pm in the Exhibit Hall

For more information: s-kiran@mail.utexas.edu

AIC meeting in Chicago

Venue: **Chicago Hilton Room PDR 2.**
Date: **Thursday, Nov 13th**
Time: **6:30 to 8:30 pm**

AIC takes this opportunity to thank

Dr Subhash Bhatnagar, Associate Professor, Department of Speech Pathology and Audiology, Marquette University.

Dr Rajinder Koul, Associate Professor, Chair, and Assistant Dean, School of Allied Health Sciences, Texas Tech University

For their generous donation towards the AIC booth

Need Volunteers to man the AIC booth!!
A fun time to coordinate with new friends & associates

From the Editor's Desk

It feels good to be able to bring out another issue of the ASHA-Kiran. This issue of the newsletter as well showcases the diverse interests and areas of expertise that members of the Asian-Indian Caucus have brought to ASHA. I would like to thank all our contributors who have taken time from their busy schedules to share their ideas, provided succinct, clear summaries of state-of-art research and bought up relevant issues that we face today as clinicians and researchers. I also strongly urge all you readers to consider writing for ASHA-Kiran, whether its about an issue that has been on your mind, to raise a question that the field needs to address or simply to share your experiences and challenges as clinicians, researchers and students. ASHA-Kiran is your forum, and an excellent opportunity to reach out to your peers in the professional community.

Megha Sundara, MS, SLP (C), AUD (C)

Speech Processing Strategies for Cochlear Implants

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There are approximately 60,000 people worldwide who have received cochlear implant (CI) devices for their hearing. Following cochlear implantation, both children and adults have shown gains in speech perception and production abilities. Significant advancements in areas of cochlear implant technology and speech processing strategies for cochlear implants are among the primary factors leading to these improvements.

Several kinds of signal processing strategies for CI have been developed over the past 25 years. These processing strategies transform the incoming speech signal into electrical stimuli, which gets transmitted to an electrode array that is inserted surgically into the cochlea. In turn, these electrodes stimulate different auditory nerve fibers at different places. Currently, SPEAK (Spectral Peak), CIS (Continuous Interleaved Sampling), and ACE (Advanced Combination Encoder) are the most widely used speech processing strategies.

The SPEAK processor continuously analyzes the incoming sound with a maximum of 20 channels (filters) that span a frequency range of 116-8000 Hz. Out of the 20, the processor selects between 5-10 filters with the largest amplitude for electrode stimulation. The selected electrodes are typically stimulated at a rate of 250 Hz. In the CIS processor, the signal is analyzed with fewer channels (between 4 and 12). The output of the filters is sent to the electrodes at high rates of 720-2400 Hz. Thus the SPEAK strategy provides a good spectral representation that is necessary for accurate identification of vowels, while CIS strategy provides a good representation of rapid envelop variations that are important in the perception of consonants (Loizou, 1999). Finally, ACE strategy is a combination of the best aspects of CIS and SPEAK strategies. In this strategy, the frequency spectrum is divided into as many as 22 frequency bands. The processor selects around 8-12 maxima and the electrodes are stimulated at high rates of 500-2400 Hz. Research has demonstrated that subjects show strong preferences for a particular speech processing strategy. In addition, research has shown superiority of one type of speech coding strategy over the others in terms of speech recognition scores.

It is very encouraging that some patients score at or near 100% correct on certain speech recognition tests with new CI devices and strategies. However, even these individuals do not hear as well as people with normal hearing, especially in adverse environments. More over, some patients simply do not perform well even with the new CI devices and speech strategies (Wilson, 2000). Hopefully, continued progress made in the areas of signal processing will in enable scientists to find better ways of electrically stimulating auditory neurons so meaningful information about speech is conveyed to the brain. This in turn may help researchers uncover the mysteries concerning how the human auditory system processes speech signals.

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Early intervention, speech language therapy and toys

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Toys are an integral part of any child's environment, a point that is not emphasized enough during parental counseling. This article is a little reminder that toys are a great tool for early intervention. There are so many toys in the market today and it matters to know how to use toys effectively to foster language.

The kind of toy, age of the child, color of the toy and the target vocabulary are influential factors in choosing a toy. The kind of toy and the age of the child go hand in hand. The kind of toy chosen should depend on multiple issues that accompany the speech language delay, like sensory difficulties, visual difficulties and motor difficulties. The age of the child is emphasized to remind us that toys chosen to promote language development need not always be chronologically age appropriate. However, one needs to remember that in such situations constant supervision is necessary. In any case, toys chosen to promote language development should be introduced under the supervision of the parent or the clinician. It is recommended that a toy not be given to the child for free play without concurrent modeling of language. This helps the child associate the toy with verbal output.

Some research suggests that bright colors (red, blue, and yellow) are the best choices for toys for newborns. Recent research, however, has found that young infants (0-6 months) focus best on objects that are black and white. For kids nine months and older, there are no specific recommendations regarding color. Target vocabulary helps to further narrow down our choices. In general, vocabulary is better retained with enriching sensory experiences. For example, texture toys help accelerate sensory awareness and hence vocabulary development.

While children often focus on only one aspect of a toy a key factor to note when selecting toys is that one toy may be used to target several vocabulary items. The same toy may be used at a later time to develop a different vocabulary item as long as we are sure that we are not confusing the children.

In my clinical experience the salient factors in promoting language development has been toys and more uncommon the toy, the better to hold a child's interest. Arts and crafts items like dot paint, big stamps, serrated scissors, things that they do not get to see and use all the time, helps retain their attention to task. "More the merrier" is a good motto with toys as we help develop language. Detailed descriptions of the kinds of toys across different age groups and their individual uses are available in a parent friendly language in the reference provided and I would recommend it to both professionals and the parents.

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Recent Developments in Voice Research: A New Voice

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Voice research at the biologic, cellular or molecular level has gained impetus in the field of vocal rehabilitation. This path of exploration is important as vocal health or illness is often dependent on cellular well being or dysfunction (Gray, 1999). The purpose of this article is to: (1) summarize some of the pioneering research on cellular aspects of voice and voice disorders, and (2) discuss novel techniques for the management of voice disorders caused due to cellular level dysfunction.

The vocal fold is a layered structure, differentiated histologically into epithelium, lamina propria (superficial, intermediate and deep layers), and the vocalis muscle, each with distinct vibromechanical properties. The protective epithelial layer of the vocal folds consists of stratified squamous epithelial cells. Recent studies have shown the role of epithelial cells in the transportation of water molecules across the epithelium. The presence of Na^+ - K^+ - ATPase in the vocal fold epithelium and the electrolyte (Na^+, K^+) transport derived from its activity provide evidence for an intrinsic mechanism to regulate volume and vocal fold hydration. Further studies documenting changes in this mechanism with physiological stress or pathology may provide clinicians with physiologically-based empirical data to guide recommendations for vocal hydration.

The lamina propria is a multilayered connective tissue with a cellular component (fibroblasts, macrophages and myofibroblasts) and a non-cellular component (elastin, collagen, hyaluronic acid and, proteoglycans constituting the extracellular matrix or ECM). During normal phonation, the vocal folds experience strains up to 30% and vibration at frequencies ranging from 100 – 1000 Hz. The visco-elastic properties of the ECM proteins provide the biomechanical support that allows the tissue to withstand the impact stresses of phonation. The cells in the vocal folds regulate the secretion of these ECM components (fibroblasts), combat inflammatory agents (macrophages) or respond to damage or injury by repair and reconstruction (myofibroblasts). Vocal pathologies resulting from voice use or misuse result from chronic or profound damage to the ECM.

Recent techniques such as gene expression analysis and proteomics have been used in characterizing vocal fold disorders in terms of changes in their cellular physiology. For instance, gene activity in response to physiological stress, biomechanical properties of extra cellular proteins and their ability to withstand vocal stresses and, cellular repair mechanism, which affects the duration and extent of recovery, have all been investigated. To make these analyses, researchers have relied on either specimen samples from individuals with the pathology or tissue culture methods to culture fibroblast cells from the lamina propria outside the body and study its response to simulated vocal stresses. Such methods enable systematic study of cellular and molecular behaviour of vocal fold tissue.Greater knowledge about the cellular mechanisms and changes associated with vocal fold pathology may introduce new directions in their management. For instance, injection of a deficient extra cellular component (like hyaluronic acid) or introduction of cultured cells to facilitate repair are all distinct possibilities. In the foreseeable future, molecular and cellular intervention is expected to augment traditional methods of vocal rehabilitation.

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Second Language – is it ever too late to learn?

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The previous stigma of bilingualism is being replaced by recent studies that show it to be a normal, prevalent, and enriching phenomenon. Between 1980 and 1990, the population of school-aged children speaking a minority language in the U.S. has increased by 41.2%. Consequently, speech language pathologists often encounter issues concerning bilingualism in their clinical practice.

A major concern for parents interested in bringing up their children bilingually, is how early to expose them to a second language (L2). Is there a 'critical period' for L2 learning? A long-standing controversy in first language acquisition, the notion of a critical period for L2 acquisition becomes far more complicated. The critical period for learning language, as explained by Lenneberg (1967) is limited by biological factors to near puberty. Often, this is interpreted as a constraint to learning any language beyond puberty. There is general consensus that younger learners are more successful in learning a L2 than older learners. The question remains nevertheless, as to whether there is an actual age limit after which it becomes virtually impossible to master an L2.

To that effect, it might be easier to examine language as phonological, morphosyntactic and/or lexical systems rather than as a homogenous whole. Research in L2 phonology suggests that L2 learners who have learnt it after five to eight years of age retain a perceptually salient foreign accent (Flege and Fletcher, 1992). Evidence from neurolinguistic investigations of morphosyntactic processing by L2 learners who have learnt it beyond 1-3 years of age (i.e. early sequential learners) indicates that although behavioral results from early bilingual participants parallel that from monolingual ones, electrophysiological data are different for the groups (Weber-Fox and Neville, 1996). Claim for an age limit in semantic acquisition for L2 is comparatively rare (Bialystok, 2001).

So, while it is evident that the relative difficulty of learning an L2 in a native-like fashion increases after a certain age range, these data do not imply that a particular L2 learner is completely unable to learn any L2 phonology or syntax after three to five years of age. In fact, it is possible to become proficient in L2 as a late learner of the language (Marinove-Todd, Marshall and Snow, 2000), depending on how 'proficiency' is defined. Since studies show that even the earliest bilinguals are different from their monolingual cohorts (Weber-Fox and Neville 1996), it is not realistic to set monolingual standards of proficiency for a bilingual child. Therefore, what is the best time to introduce an L2 to a child depends on the goals of proficiency desired by the parents. And as Grosjean (1989) says, "a bilingual is not two monolinguals in one person"!!

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Group Delay in Digital Hearing Aids: Interesting Clinical Implications

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Digital hearing aids introduce a delay (called group delay) to the signal path ranging from 1 to 10 milliseconds (ms). While this delay is not significant enough to create echoes, it may change sound quality. Thus, a hearing aid wearer can potentially hear two different versions of his/her voice; one, a real-time version through the bone-conduction route, and the other, a delayed version through the hearing aid. An asynchrony of approximately 0.7 ms exists between the two signals in normal ears. This does not affect the perception of the speaker's own voice primarily because individuals adapt to this minimal asynchrony. Any greater delay, however, is likely to alter the timbre of the perceived speech. Recent research shows that normal-hearing subjects find a delay of 10 msec or more 'objectionable', and subjects with cochlear hearing loss find a 20-30 ms delay 'disturbing'.

Group delay can also affect auditory localization by altering interaural time difference (ITD) cues that play an important role in sound localization. In monaural hearing aids, sounds arriving from the aided side get delayed before reaching the eardrum. At mid frequencies, the ITD is about 600 – 700 microseconds. Hence the sound waves reach the opposite ear before reaching the aided ear, resulting in reversal of ITD cues. The problem of localization is further complicated as sound localization also depends on interaural level difference (ILD) and the interaction between ITD and ILD.

In our laboratory, we are currently investigating the effect of group delay on perceived sound quality. A brief description of the first phase of the project is given here. In this set of experiments, we created delayed versions of sentences from the Hearing in Noise Test by mixing a copy of each sentence to the original with different amounts of delay (0-50 ms). We then asked 15 normal-hearing subjects to determine the most noticeable delays in terms of *overall quality, pitch, and roughness* in a paired comparison task. Data from normal-hearing subjects indicates that small and large delays (2-5 ms; and >15 ms) are more noticeable than intermediate delays (8-15 msec). The short delays (2-5 ms) correspond to the time period of a one-half cycle of 100-250 Hz, which happens to be the fundamental frequency (f_0) for many speakers. When a sentence is mixed with itself after a delay corresponding to the time period of f_0, the two versions just add up. But if the delay corresponds to one-half of the time period of f_0, the pitch is raised and speech sounds '*tinny*'. The results presented here while preliminary, provide interesting avenues for further research. Perhaps in the near future when the hearing-aid wearer complains '*my voice sounds funny,*' we will have one more solution for troubleshooting.

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Comments and Suggestions:

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