AUDITORY PROCESSING DISORDERS AND THE SCHOOL-AGE CHILD

Presentation by Jack Katz, University at Buffalo

I. WHAT IS AUDITORY PROCESSING (AP)?

Simply put, AP is what we do, with what we hear. An AP disorder (APD) is when we hear information, but are not able to work with it efficiently to derive what is required. In today's presentation we will discuss four types of APD which may influence a child's ability to achieve academically, communicate properly and/or influence personality/behavior.

II. MAJOR TYPES OF AP

Children who are seen because of learning or other problems that are associated with APD are generally found to have more than one type of processing difficulty. The combination of APDs and their severities help to determine the characteristics that are observed in the classroom or by speech-language pathologists, reading specialists and resource room teachers. The four types of APD are described below. Not every child will have all of the associated difficulties, but I suspect that you will recognize one or two of your pupils from the description.

A. Decoding - The AP Decoding category generally refers to the ability to process at the phonemic (speech-sound) level. In order for us to learn and communicate effectively we must be able to discriminate speech sounds, remember them and be able to manipulate or blend them. If we cannot do this quickly and accurately, this can lead to important difficulties in school.

Children who have Decoding problems often have speech articulation problems and receptive language difficulties. This is not surprising as poor Decoding is thought to result from vague or faulty phonemic information being used by the brain to analyze incoming speech. This lack of correct phonemic images can be reflected in one's speech and shown by confusions in receptive language.

Academically, these children generally have difficulty in phonics along with errors in reading (word) accuracy. Similarly, it is linked to poor spelling. Some children who have Decoding problems are able to compensate for this limitation in the early grades if they have excellent visual recall.

Because of their difficulty in deriving a great deal of information from speech (especially when spoken rapidly or by a person with a foreign dialect) they often become confused when the teacher gives instruction to the class.

B. Tolerance-Fading Memory (TFM) - This type of APD is associated with a combination of two processing difficulties. When they appear separately, they generally do not have a major impact on reading or communication and therefore seldom are responsible for a learning problem by themselves.

The two aspects of APD that make up the TFM category are difficulty dealing with background noise (even at a moderate level) and poor short-term auditory memory The noise problem, sometimes referred to as a figure-ground problem, is reflected in much reduced ability in understanding speech in a background of noise and/or an intolerance for environmental noises.

Academically, the problems are milder than those seen in the Decoding group. Reading comprehension is generally poor, as well as the child's expressive language skills (in older children this can be seen in their written expression, as well as in verbal). These children also have difficulty in following the teacher's instructions, but unlike the Decoding group, these children forget what they are to do.

Children in this group are commonly hyperactive although some are hypoactive. They are often nervous/frightened and characteristically are not well liked by peers (or their teachers/audiologists). Although there is no specific articulation problems that are associated with TFM, some of these children speak too rapidly

The TFM and Decoding groups are the most common types of APD and unfortunately are often found together. The presence of both problems compounds the child's difficulty greatly.

C. Integration - Although Integration problems are much less common in the population of children we see, it is generally a more severe disorder than either of the two previous types. We have seen it in about 15% of the APD children whom we have evaluated.

This type of problem is generally associated with auditory-visual integration difficulty, however, other types are also seen. Those with auditory-visual problems are often diagnosed as dyslexic (severe reading and spelling problem which is very difficult to remediate and in my experience responds best to a multi-sensory training approach). These children tend to have very long delays in responding. Without knowledge of this problem, the child may appear ignorant of the answer or willful.

The integration cases that have the auditory-visual problems generally demonstrate very poor phonemic decoding skills as well.

D. Organization - Those with pure organizational problems are the least likely to be seen by an audiologist, as it generally does not create a major problem academically or in communication. However, it is more often seen along with one or more other categories of APD. In this case the added burden makes the problem frustrating and ego-deflating for the child.

Organization difficulties are demonstrated on our tests by poor sequencing ability. If one is not able to maintain the proper sequence of information, it is easy to see how the person would behave in a disorganized manner. This problem requires a great deal of effort by the child to keep things straight and therefore reduces his or her effectiveness because of an inability to deal with the matters at hand and to keep them in the proper order.

III. EVALUATION OF APD

At our center, audiologists and other professionals work together to understand the problems seen in children who have APD. However, the major responsibility for diagnosing APD and the type(s) of problem(s) usually falls to the audiologists. Additional details are attached regarding the audiologic and speech-language contributions.

IV. OTITIS MEDIA (OM) AND ITS INFLUENCE ON APD AND OTHER FUNCTIONS

Otitis media (inflammation of the middle ear) is a very common disorder in young children, starting in their preschool years. If the disorder begins early in life (e.g., within the first year) and there are several bouts in each of the first two years, there is a reasonable chance that this could have a significant effect on the child's development of good AP skills. OM is also associated with poor academic, language and articulation abilities.

Today's presentation will review some of these findings and give you a chance to hear what it sounds like to have OM.

V. REMEDIATION OF APD

One of the most important reasons for determining the type of APD that a child has is that it gives you information about how to treat the difficulty in the regular class, by speech-language pathologists and special educators. See final sheet in this handout.

Some might call Johnny a problem child. School does not come easy for him. He has trouble expressing himself and understanding what he reads. His auditory memory is poor, and he cannot repeat a telephone number in toto. At home, he frequently does not respond when his parents speak to him from another room. Johnny has a communication problem. Specifically, a central auditory processing (CAP) disorder.

AUDITORY PROCESSING

UB clinic evaluates and treats clients with communication problems

By Sue Wuetcher

Jack Katz, professor of audiology at the University at Buffalo, defines CAP simply as "what we do with what we hear. A lot of people can hear, but they don't manage what they hear very well."

Individuals with CAP problems may confuse sounds, mix up words, and have trouble blocking out background noise. They frequently have learning difficulties.

" Even professionals are frequently confused by the area of auditory processing," Katz notes. "Without a basic understanding of the disorder, they have no idea how to treat it."

The CAP clinic, part of the Speech-Language and Hearing Clinic at UB, evaluates and treats individuals with CAP problems. Research by faculty members in the Department of Communicative Disorders and Sciences, which operates the clinic, serves as a basis for the CAP clinic's work.

"We work from diagnostic and theoretical foundations. Over the past 15 years, we have gained a lot of experience in working with children and adults with these problems." Katz says, "Because of our research on the basic auditory disorders, we are able to tailor a program that will remediate the problems."

He outlines three major areas in which central auditory processing falters:

- **Phonemic decoding.** Deficiencies in this area occur when information is not coded correctly into the brain. "Individuals don't have the correct image in their brain of what they should be listening for. It's almost as if everybody has a foreign accent to them. It takes a little bit longer to figure out what's been said," he says.

Persons with phonemic decoding problems are slow in their responses, are frequently confused by verbal concepts such as verbal descriptions and instructions, and have difficulty understanding what people say because the sounds are not readily recognized or because people speak too rapidly.

These people frequently have significant reading and spelling problems, he says. They can follow slow, simple or repetitive material, but cannot keep up with the teacher after hours of new or abstract material.

They have trouble matching sounds with letters, possibly because of problems perceiving the qualities of sounds. Consequently, they are poor in phonics and have difficulty reading new words. In spelling, which depends mostly on auditory skills, individuals can't figure out the letters to go with the sounds because they don't have a good concept of the sounds themselves.

- **Tolerance-fading memory.** Children with this problem have an intolerance for background noise, and their understanding of speech declines markedly when noise is present. They also have a strong tendency to have poor auditory memory. "So the things they do hear, even if they hear quite clearly, are rapidly lost." Katz says. For example, when giving these persons a telephone number, it is best to say it in segments because their memories fade so quickly. They often are easily distracted and have problems

with reading comprehension and expressive language.

• **Integration.** Children with integration problems have difficulty tying together auditory and visual information. They frequently experience long delays in responding and may possess the most severe reading and spelling problems.

A fourth area of difficulty, which overlaps the previous three, is called the organization category. Individuals with this problem are disorganized in their handling of auditory and other information. "These are typically the kids who look sloppy with their shirts half out and their jackets not quite right. When you look at their desks, they're a total mess. They often lose their belongings." Katz says.

When given numbers to repeat, these children don't recite them in the proper order and they often transpose letters in spelling.

Clinicians at the CAP clinic give potential clients a battery of tests to differentiate between hearing and central auditory problems. Once limited CAP skills are noted, tests are administered to classify the specific central auditory impairment and to determine if there are any unique characteristics. Clinicians then provide a specific therapy program geared toward improving the diagnosed central auditory problems.

The UB program is unique in its emphasis on rehabilitation, Katz notes.

"Unlike many programs, our evaluations and diagnoses are oriented toward rehabilitation and management," he says. "In many places, they test to find out if the child has auditory processing difficulties. And that's pretty much a foregone conclusion because CAP disorders are so common and because almost everybody that's referred to us is strongly suspected of having difficulty in auditory processing or in hearing. The thing that we feel is most important is to find out specifically what's wrong so we can know what to do about it," he says.

For example, therapy for individuals with phonemic decoding problems enables them to "listen to sounds as they've never heard them before," Katz explains. Words are presented sound by sound. Each sound is presented independently, with a long pause between them, to help clear up any misconceptions the clients may have about the sounds.

Much of the CAP clinic's foundation comes from research conducted by department faculty members. Katz has two projects, the results of which may be used to help CAP clients.

The first is a detailed study of the relationship between personality factors and school performance in children with central auditory difficulties.

Past experience has indicated that children with a specific central auditory problem have difficulty in a specific learning modality, such as reading comprehension, he says. "Over the years we have noted certain personality characteristics in these youngsters. This encourages us to think that specific personality characteristics may be associated with auditory deficiencies."

"Even professionals are frequently confused by the area of auditory processing. Without a basic understanding of the disorder, they have no idea how to treat it."

For example, children with tolerance-fading memory difficulties have a tendency to be hyperactive and frightened. A significant number are not well liked, and they often do erratic and negative things.

"In this project, we are trying to get a better understanding of these connections," Katz says. "It will provide us with a more complete picture of the children."

Nine researchers from the United States and Canada are gathering data on at least 200 children with CAP problems. The subjects first will be evaluated to determine their specific central auditory problem. Researchers then will try to match these up with the subjects' strengths and weaknesses in school, their leisure activities and their personality traits.

In the other project, Katz and his research team are evaluating inmates at the Buffalo Secure Facility, formerly Masten Park, a state-operated detention facility for youths.

The researchers had predicted that the results of the inmates' central auditory tests would be similar to those of learning disabled youth since, as a group, Katz says, people who are incarcerated tend to have considerable learning difficulties. They tend to have poor language ability and more hearing problems than most people. "So there are a lot of things that would tend to break down their communication, either in comprehension or in expression."

Researchers were not surprised to find difficulties, but were amazed by the enormity of the problem, Katz says. Eighty-three of the 86 persons tested—97 percent—failed one or more parts of the four-part test. Seventy-five percent failed two or more parts of the exam.

Researchers also were surprised that the results of the inmates' tests were the opposite of those of the learning disabled youth.

The learning disabled at this age show their major problems in auditory memory and blocking out background noise. The inmates' problems were mostly in phonemic decoding rather than in tolerance-fading memory, he notes. They frequently seemed to be able to express themselves, but had great difficulty fathoming verbal concepts.

This ties in with what sociologists see in people who have committed crimes—they don't have the usual associations with society and institutions, Katz says. If the inmates don't have a clear understanding of what words mean and what the concepts are, they can't be expected to develop normal feeling about society.

"Most people do not take a communicative disorders view of the prison population," he adds. "They tend to take a psychological or sociological approach."

The typical remedial approaches that have been used with incarcerated youth have been vocational training and psychotherapy. While these approaches are intuitively logical, they have not been very successful, he says, "based on the recitivism rate.

"I think one of the ingredients that is missed is that these kids can't take full advantage of efforts such as psychotherapy if they don't have a good understanding of what's going on. If their auditory and communicative skills are not addressed when they're in prison, then they would stand a very good chance of being right back in the same situation when they get out."

Katz says he would like to develop an auditory training program for the prison population to see if he can obtain results similar to those achieved with the learning disabled.

Researchers will give the youths an opportunity to work on their auditory problems. After the youths undergo therapy, the researchers will check with teachers and the facility administration to see if their classroom performance and general behavior have changed. The inmates also will be given standardized tests to determine if their academic and auditory skills have improved.

Katz is applying for a grant from the National Institute of Neurological and Communicative Disorders and Stroke to fund the research. The results that already have been obtained will be cross-validated by testing more inmates.