

## **Research**

### Faculty Member

### Description of Research Area

Anne C. Bothe

#### **Preschool Stuttering: Measurement, Training, and Recovery Time-Interval Investigations of Stuttering Measurement.**

Purposes of research: to develop validated and reliable measurement methods for assessing the stuttering of children and adults; to determine the factors that influence children's treated and untreated recovery from stuttering; to determine the influence of measurement and other variables on stuttering treatment outcomes for children and adults

Foci of research: observer-judged measurements of stuttering, reliability of observer judgments of disordered speech, judge training for stuttering measurement, children's recovery from stuttering, stuttering treatment in children and adults; currently moving into or adding broader quality of life measurement tools

Impact and significance: measurement work allows clinicians and researchers to gather useful, replicable, standard-based data about the stuttering of children and adults, something that makes clinical and research interpretation of data trends possible in a way that has not previously been possible -- and that, in turn, means nothing less than an impact on the overall validity of stuttering research results; child stuttering recovery work will allow us to make data-based recommendations to the parents of the approximately 4-5% of preschoolers who stutter about how they should treat (or not treat) their children's stuttering, and when; stuttering treatment research improves our ability to reduce a speech disorder that can be disabling and handicapping to approximately 4-5% of children and approximately 1% of adults in all known cultural and language groups worldwide -- implications as large as workforce productivity, etc.

Liang Chen

#### **Language development in diverse contexts**

My primary research interest is first and second language development in children and adults within a functional, conceptual, and typological framework. My current research include the acquisition and use of Mandarin Chinese, the acquisition and use of English as a second language by US-born Mandarin-speaking

children, heritage language learners, and the acquisition and use of English as a foreign language by adult Mandarin speakers. By examining the development of a range of typologically defined and interesting grammatical forms and discourse functions in English and Mandarin Chinese by learners with different backgrounds, I hope to identify contributing factors that influence the course of acquisition of any particular form (e.g., passive construction) and discourse function (e.g., cohesion and coherence). I am also interested in cognitive consequences of linguistic relativity. My study on the acquisition and use of motion event expressions

*(e.g., You are riding down solemn avenues of beech and across sunny glades of oak in Narnia.)* has revealed pervasive effects of language-specific properties on our perception, conceptualization, and memory of objects and events.

My ongoing research on discourse development in US-born Mandarin-speaking children will provide valuable information for speech language pathologists and other professionals to work more effectively with students from culturally and linguistically diverse (CLD) populations. It will also lay a foundation for future studies comparing language and academic development of immigrant children who are born in the United States but with different first language background.

Al De Chicchis

**Vitamin B-12 Deficiency in Elderly Nutrition Studies  
Vitamin D Deficiency and Auditory Function of Genetically  
Disordered Mice. The aging auditory system.**

My research, in the past few years, has focused on two areas, both of which relate to the aging auditory system. Two lines of questions have been developed and explored using three different research designs.

One of these areas pertains to the question of auditory attention. Specifically, the research question was concerned with the effects of aging on the ability to attend to certain auditory stimuli while ignoring other stimuli presented simultaneously. The research question was addressed using neurophysiologic recordings of filtered EEG activity from 21 surface electrodes arrayed across the scalp. The issue of auditory attention is of paramount importance in an aging population, because one of the most common complaints among elderly individuals is that they hear but don't understand when they are in group situations. In other words, the ability to

block out competing auditory signals is difficult for them. Understanding whether this is an auditory attention problem or just a problem of the auditory system to minimize interference of competing stimuli has significant implications on the overall aural rehabilitation needs of this elderly population. That is, individuals who demonstrate a loss of cognitive skills (auditory attention) will benefit less from intervention strategies than those individuals who have problems dealing with signal competition. Our work, thus far, points to a signal competition rather than an auditory attention problem.

I have also been engaged in research investigating the effects of auditory attention using functional magnetic resonance imaging (fMRI) techniques. Using fMRI procedures, we examined blood flow activation in the brain when individuals listened for and responded to target speech stimuli. Three listening conditions: ignore, attend, and detect were employed in the experimental paradigm. Similar to the research projects using neurophysiologic recording procedures, this work will contribute greatly to our understanding of auditory processing abilities in the elderly population and how they may differ from young listeners.

The second area of research focuses on the effects of nutrient deficiency on auditory function. The purpose of this research is to develop a mouse model to study the interactions of genetics and diet in accelerating the progression of age-related auditory dysfunction. Approximately 28 million Americans are deaf or hard of hearing, and age-related hearing loss is the most prevalent auditory disorder. Despite the contribution of diet and genetics to many age-related chronic health conditions, there has been no systematic research effort directed toward understanding the combined role of nutrition and genetics in age-related hearing loss. Thus, this research will provide new insight into the possible interrelationships of nutrition, genetics and age on auditory function.

**Impact:** Hearing impairment affects approximately 28 million people in the United States, and is the third most chronic health condition experienced by the elderly. Only arthritis and hypertension supercede it. Moreover, vitamin D deficiency is a common problem in the U.S. in spite of the fact that it is one of only a very few countries that fortifies a food staple (milk) with that vitamin. This problem is evident especially in the elderly. To our knowledge, we are the only research team investigating the relationship of hearing loss with vitamin D, calcium, dairy foods and bone health. If we identify nutritional factors associated with

hearing loss, the potential is great that diet and other interventions throughout the life cycle will decrease the incidence of hearing loss and improve the quality of life for many.

Keller-Bell, Yolanda **Language development and speech processing in children with cognitive disabilities**

The focus of my research is language development and speech processing in children with cognitive disabilities, such as Down syndrome and Fragile X, and children from culturally diverse populations. In general, my research tries to determine what aspects of language children with cognitive disabilities have difficulty learning, to identify any contributory factors, and to develop strategies for treatment. My research on children from culturally diverse backgrounds examines dialectal variation and narrative development.

Impact: My research will help speech-language pathologists and other professionals identify areas of need for intervention and provide a basis for designing outcome-based treatment strategies.

Suneeti Nathani **Infant Vocalizations and the Foundations for Speech**

My primary research interest is to examine vocalizations made by typically developing infants in an effort to understand the normal sequence of vocal development and to see if we can identify the basic underpinnings of human communication in these early vocal behaviors. I am also interested in examining the impact of factors, such as hearing, family history, and language environment, on the development of early communication. Understanding the role of these factors can potentially lead to early identification and intervention of communicative deficits.

This research would meet existing federal initiatives that emphasize early assessment and intervention for infants at risk for communicative impairments. With increased universal newborn hearing screening, greater numbers of infants with hearing impairment are being identified in the first year of life. My research directly addresses service provision for these infants.

Rebecca S. Marshall **Attention and Aphasia: Identifying the Role of Binding Behavioral and Imaging Paradigms for Determining the Role of Binding in Aphasia and Attention Cognitive processing and**

## **aging in normal and neurological disordered populations**

My research area is interdisciplinary due to my training in both neuropsychology and speech-language pathology. My focus is on cognitive processing in the normal and disordered aging process.

This research includes individuals who have suffered from a stroke or other neurologic disorder (i.e., epilepsy; Wright, Shisler & Rau, 2003) as well as healthy aging individuals. My overall goal as a researcher is to determine the functioning of the brain and how this relates to the behavioral performance of patients. In a broader sense, my goal is to study the relationship between clinical aspects of the discipline and research.

In particular, my most recent research has focused on the assessment of how attentional constraints may affect the role of auditory perceptual binding (combining identity and location information) in language. I have used behavioral paradigms to study the role of binding and attention for individuals with aphasia and for healthy aging individuals. The strength of this research is that it is basic in nature, but has real life applications. The long-term goal of my research is to provide a better understanding of the role of binding and attention in language, which has led to research on the functional neurocognitive underpinnings for these processes using fMRI. The fMRI studies have focused on the topography of the processes of binding and attention in both aphasia patients as well as healthy younger and older individuals. This research has fostered numerous interdisciplinary collaborations with various hospitals and universities in Georgia, as well as nationally.

I have found that individuals with aphasia demonstrate auditory attention deficits and that this may influence their ability to communicate effectively after a stroke (Shisler, 2003). This suggests that individuals with aphasia have auditory attention deficits that are not being assessed in routine speech-language evaluations. This could impact the profession by altering some of the practices in adult neurogenics in speech-language pathology nationwide. I hope to examine the best method of assessment and treatment of these deficits and how this could influence these individuals language performance, then benefiting individuals with this acquired disorder in Georgia, and eventually nationally.

Additionally, I found that auditory attention declines with age and in a cross sectional age study, it was found that with each progressive age group, auditory attention deficits increase (Shisler

& Gaucia, 2003). Documenting older individuals' attention deficits and where those occur in the aging process is essential for comparison to the disordered attentional system (i.e., after stroke) as well as determining deficits that occur in normal aging. These findings led to my research using fMRI in studying auditory attention and binding in younger and older individuals. The data revealed that older individuals activate different areas of the brain during these auditory attention tasks in comparison to younger individuals (Shisler, Allison, Lavin, Balan, Meador, Loring & Pillai, in preparation). This is important to the field because much of the behavioral research focuses on aging being a slowing of cognitive processes; however, it appears that the different areas of the brain may be used in old age. With the population of individuals over the age of 55 growing, it is imperative to further study these cognitive processes and how they influence functioning with increasing age and quality of life in older individuals.