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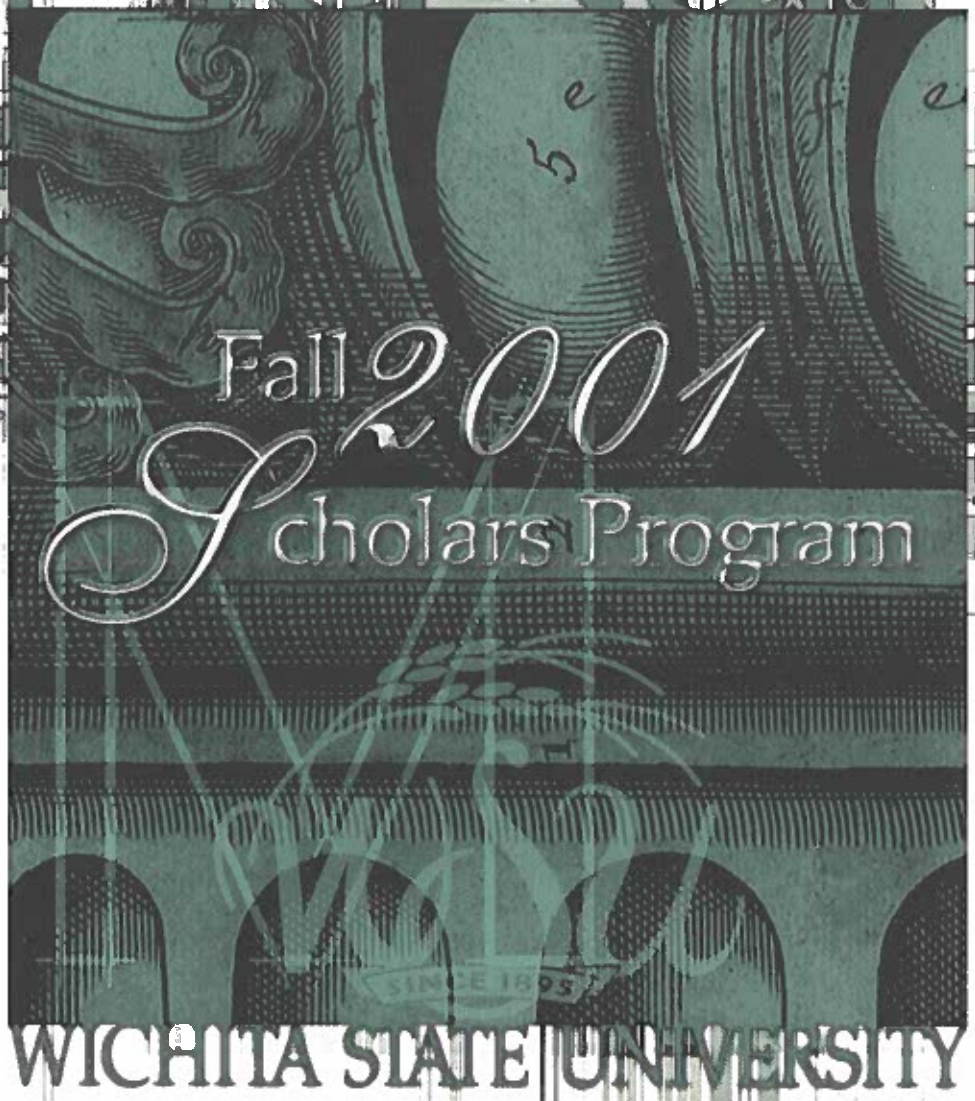


Fall 2001

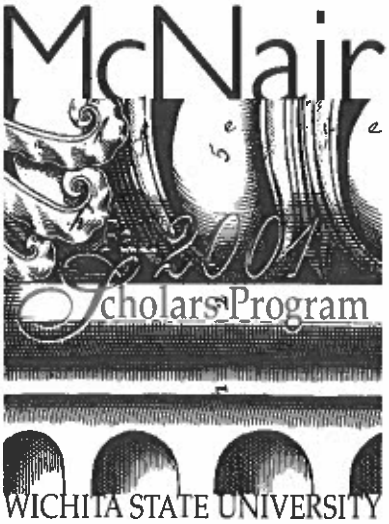
Scholars Program

WICHITA STATE UNIVERSITY

Journal of Research Reports

"True courage comes in enduring . . . persevering and believing in oneself."

—Ronald McNair



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The *Journal of Research Reports* is produced and published annually by the Wichita State University McNair Scholars Program to further the objectives of the program. The goal of the McNair Scholars Program is to provide quality services which encourage students who are underrepresented in higher education to graduate with bachelor's degrees from WSU and to pursue post-baccalaureate degrees.

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From the Director

I am proud to present this volume of the *Journal of Research Reports*. The articles featured in this journal represent the work of the program participants from 2000-2001 grant year. As one reads through these articles, it is clear that the breadth of research interests is diverse and the quality is outstanding. My staff and I could not be more pleased with their efforts to produce meaningful and scholarly works.

The program could not achieve without the support of the University faculty and other professionals who mentored students this past year. These mentors have not only guided the McNair students but have inspired them to heights unimaginable. All mentors are to be applauded for their volunteer efforts in making undergraduate research a reality for the students in the program.

A special word of thanks is directed to our research assistant, Jan Petersen. Her dedication to the program and keen ability to motivate the students to produce the best possible manuscripts is greatly appreciated. Appreciation is given to our writing tutor, Fariha Baloch, who undertook the tedious task of editing all the manuscripts. These two individuals spearheaded our efforts to produce this document.

Finally, I would like to congratulate the students for going beyond the classroom and putting the research interests into practice. Many of the students spent a year or longer on their research projects. Their efforts will bear much fruit and inspire other students to engage in research in the future.

Larry A. Ramos
Director

Congruence between Parents' Goals and School IEP Objectives for Children with Autism Spectrum Disorders

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Abstract

Autism Spectrum Disorders (ASD) seriously impact communication and social interactions for more than 67,000 children nationwide. The impact of ASD is lifelong and often devastating. The likelihood of favorable outcomes for these children is increased by intensive early intervention through the coordinated efforts of service providers and parents. Extensive ethnographic interviews were conducted with 11 mothers to identify their educational goals for their children with ASD. Themes and related goals were ascertained from these interviews and compared with those on their children's most recent Individualized Education Plans (IEP). Meaningful parental involvement in educational planning would be suggested by strong congruence between the parent's themes and goals and those of the school for the child. In this study, there was reasonable correspondence between broad themes. However, specific goals within themes did not match well. These comparisons are discussed, in addition to IEP planning experiences and educational themes and issues problematic to ASD, as defined by the mothers.

Congruence between Parents' Goals and School IEP Objectives for Children with Autism Spectrum Disorders

Autism Spectrum Disorders (ASD) are a collection of pervasive developmental disorders with lifelong, potentially devastating consequences for the individual and for family members providing their care. According to the American Psychiatric Association (APA; 1994), the primary features of these disorders are severely compromised communication and social interactions, stereotypic behaviors, and restricted interests and activities. ASD cross all regions, cultures, and socioeconomic classes. Their cause is unknown, and there is no cure—although early, intensive education can be helpful in enabling these children to develop certain skills, and medication may reduce disorder symptoms (National Center for Birth Defects and Developmental Disabilities, 2001).

The five diagnoses that are included in this diagnostic category are Autistic Disorder, Asperger's Disorder, Childhood Disintegrative Disorder, Rett's Disorder, and Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS). They primarily differ in terms of severity and manifestations of the key features (APA, 1994). The disorders also differ in age of onset, probability of normal intellectual functioning, and occurrence of developmental regression.

More than 67,000 children with ASD nationwide received special education services in 1999 (National Center for Education Statistics, 2000). That number appears to be climbing. Unfortunately, no single method has been found to be effective in helping every child with ASD (Dunlap & Bunton-Pierce, 1999). Special education and effective intervention offer the best hope for these children to become optimally functioning adults (Simpson & Myles, 1998). The key to progress for a child with autism is the development of a comprehensive program that is tailored to the specific child (Dunlap & Bunton-Pierce, 1999).

Identifying the unique mix of services and program demands for an autistic child's Individualized Education Plan (IEP) is best accomplished through the cohesive planning efforts of service professionals and the child's parents. Professionals have formal training and experience in program options and implementation. Parents have invaluable, first-hand knowledge about factors that enhance their child's functioning as well as those that compromise and impede the child's growth. Parents also possess knowledge about their child's developmental history and unique learning characteristics (Dunlap & Fox, 1999). However, even the best individualized educational program is destined to fail if its key participants—the professionals and the parents—are unable to communicate effectively (Hallahan & Kauffman, 2000).

The purpose of this research was to examine cohesion among members of educational planning teams for children with ASD. Specifically, this research compared the alignment of goals identified by the children's mothers and those objectives that ultimately appeared on the corresponding IEP. Good congruence would suggest a cooperating, well-functioning services team. Conversely, poor congruence would indicate possible breakdowns in communication efforts—and at minimum, a difference in outcome goals among the child's educational planning team members.

Method

Participants

Mothers of 11 children diagnosed with ASD were interviewed as participants in this study. They were identified through contact with agencies, schools, parent support groups, and individuals in six counties of a midwestern state. Participants expressed (a) an interest in learning more about their child's disability, and (b) a desire to help others understand parents' perspectives on the lives and school experiences of children with autism. (In all reports of this study, the names of the children have been changed to protect their privacy.)

During two interviews with mothers for this research, the child's father was also present. Both fathers specifically asked to be present, in order to improve their understanding of the disorder affecting their child. However, the researcher focused on the mother's responses for consistency in methodology. Also, one participant was the mother of two children with autism, in addition to having a third, normally developing child. This mother was asked to respond during the interview by focusing on only one child.

Children about whom the mothers provided information ranged in age from 4.3 years to 17.0 years at the time of the interviews, and all resided in the mother's home. The median age was 7.2 years. The children included three girls and eight boys; all were Caucasian. Data on family income were not collected. However, the interviewer gained impressions of socioeconomic levels as parents commented about their vocations and those of their spouses, and because most interviews (n = 7) occurred in the child's home. Based on these experiences, the interviewer concluded that these families' socioeconomic levels varied from lower middle to upper middle class. Ten children attended area public (pre)schools, while the remaining child received educational and vocational training services through a private special educational agency.

The primary diagnoses of the children whose mothers participated in this study included autism (n = 5), Asperger's Disorder (n = 2), Pervasive Development Disorder-Not Otherwise Specified (n = 2), and aphasic with autistic tendencies (n = 1). An additional child was diagnosed with global developmental delays, pervasive developmental disorder, or autism, depending upon the diagnostician's background (neurology or developmental pediatrics). Three children were also being treated for concurrent seizure disorders.

Procedure

Each mother participated in two interviews of at least one hour each. Most interviews took place within the mother's home (n = 7) or by telephone (n = 1) while the mother was at home. Others (n = 3) occurred in a restaurant of the participant's choice. All interviews were audio recorded. Ethnographic interviewing techniques were used to elicit from the mothers descriptions of their children's functioning in daily life at home, in the community, and within the school setting. Participants were encouraged to talk about their experiences with their child through a series of open-ended ethnographic questions.

At the beginning of the first interview, each participant was informed verbally and in writing that this study involved gathering information pertinent to children with ASD. Mothers then signed a consent form before the interview began. Mothers were also asked at the onset not to review their child's current IEP.

During the first interview, the mother discussed the child's routine on a typical day, as well as the child's strengths and challenges, any diagnoses and how they came about, and ongoing treatment, including medications taken by the child. The second interview focused specifically on the child's school experiences. Mothers were encouraged to talk about their child's academic performance; any program modifications; strengths and concerns about their child's education plan; and the mother's goals for the child over the next 12 months. Additionally, the mother was asked to describe what she envisioned for her child's future. In most instances, the mother also discussed her experience with developing her child's individualized education plan toward the end of the second interview. At the conclusion of the interviews, participants were asked to provide a photocopy of their child's current IEP. All participants reported that they had complied with the interviewer's request to refrain from reviewing their child's current IEP. However, it was determined based on comments made by one mother to the researcher that she had actually reviewed her child's IEP in preparation for a parent-requested school staffing which occurred within a day of the second interview. As a result, comparisons of her goals with those cited in her child's IEP were not included in this study.

The purpose of this study was to examine the congruence between the broad themes and related goals expressed by parents and those on the child's IEP. All interviews were transcribed verbatim, and the names of the children and their parents were changed to maintain confidentiality. Two researchers independently reviewed the transcripts for general themes and goals expressed by the participants,

and they compared their respective findings. Consensus was attained in identifying each theme and goal. From this collaborative effort, the researchers derived general themes for each interview, and specific goals were subsequently assigned to relevant themes.

Similarly, the child's IEP was reviewed separately by two researchers after a several-week time lapse and in a different order from the respective interviews. Themes and goals were identified, as stated in the IEP. Finally, each mother's themes and goals were compared for congruency with those in the IEP in two, separate analyses. First, themes from the interview and from the IEP were compared. Then goals from the interview and IEP were compared. The researchers recognized that although native language may have differed, goals from the two sources were at times similar based on the context of the conversation. Appropriate matches were made accordingly.

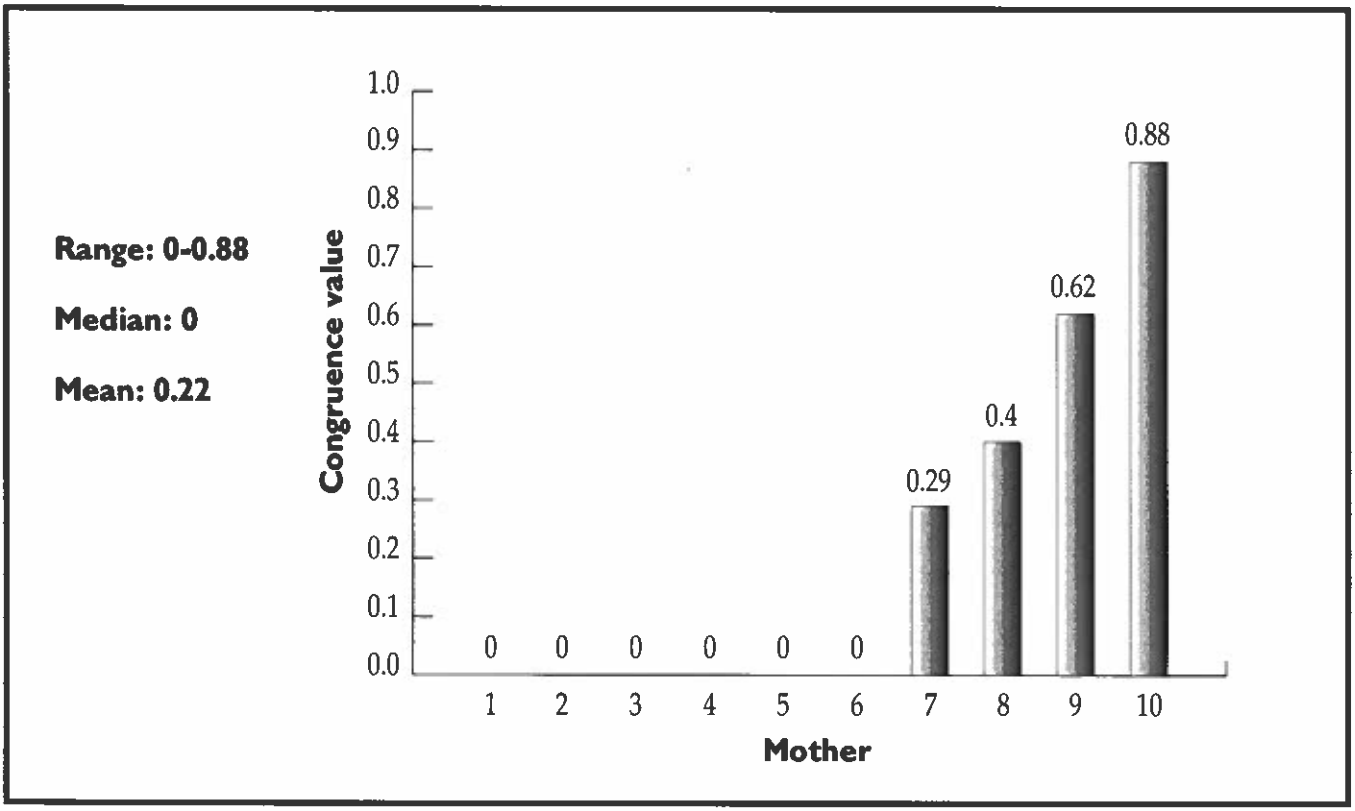
Materials

The interviewer prepared a set of open-ended questions based on the formats of grand tour, mini tour, and guided mini tour questions from ethnographic research methodology (Spradley, 1979). These questions served as a starting point. The interviewer adapted subsequent questions based on the mother's responses, and where possible, the interviewer incorporated the mother's native language. In all interviews, the participant was encouraged to freely discuss her child without time constraints or restrictions imposed by the interviewer.

Results

A series of common educational themes surfaced during parent interviews, including academic skills and readiness; speech and communication skills; occupational or physical therapy (OT/PT); adaptive physical education (PE); social skills; life/self-help skills; parent needs; global needs; and specific service provisions for which the child's school would be responsible (academic school responsibilities). To calculate congruence of the themes, for each child, the themes across the two interviews and the IEP were tallied for a total number of themes. Themes occurring on both lists were then counted. The percentage of matched themes relative to the total number of themes was the congruence value for themes. For example, if the mother's interview contained the themes of academic, OT/PT, and life/self-help skills, and the IEP contained themes of academic and speech/communication, the total number of themes was 5, the number of matched themes was 2, and the congruence was 40%, or 0.40. In calculating congruence rates for goals, a value of 0.0 was recorded in two situations: (a) when the theme occurred on only the interview or the IEP, but not both; and (b) when the theme occurred on both lists, but none of the goals matched. Otherwise, the goals for a given theme were totaled from the two lists, the number of matching goals was determined, and the percentage representing congruence was calculated.

Speech/Communication Theme: Congruence of Goals



Themes and Goals

There was reasonably good correspondence between the educational themes expressed by the parents and those addressed on the child's IEP. Alignment of these general themes between mother's responses and child's IEP ranged from 0.38 to complete alignment, 1.0. For the 10 interviews that were analyzed, both the mean and median congruence rates for themes were 0.69, on a scale of 0.0-1.0.

The second basic analysis of the data involved examination of the goals within each theme. Examples of a parent's goals for her child within the general speech/communication theme included things like: improve articulation, explain actions, or increase therapy time provided. The latter was a goal commonly expressed by mothers, many of whom cited that their child received a total of 15 minutes of speech services a week. Typical speech/communication goals identified on IEPs included: sort and label pictures or objects, repeat words or phrases, or imitate speech or nonspeech sounds in general. For 6 of the 10 mothers who identified goals with a speech/communication theme, there was no alignment at all. The range of overall alignment within the speech/communication category was 0.0-0.88, on a scale of 0.0-1.0. The median was 0.0, while the mean was 0.22.

Actual goals within these general themes typically matched poorly, and in no instance was there total alignment of goals between a parent's interview and her child's IEP. The highest congruence rates for goals were within the themes of academic skills/readiness and OT/PT. This finding is not surprising, given that academics are the primary focus of the school and that a child's motor difficulties are usually readily apparent to observers. However, the congruence rates for goals within the themes of speech/communication and social skills were much lower, even though severe difficulties with communication and social interactions are central to ASD. The lower rates for goals within these themes may indicate fundamental differences in the understanding that school staff and parents have of these disorders, or in the approaches to use to address the difficulties.

Five participants (50%) in this study specified goals relating to safety in general. The child's ability to swim was a major concern for many of these parents, given their child's tendency to wander off at times. Parents frequently expressed alarm that their child didn't seem to have a sense of danger.

Two parents specifically stated goals with regard to their own needs as they related to educating their child. No child's IEP identified goals that could be categorized within this theme. These parents expressed a strong desire for guidance regarding homework, particularly with how to improve the child's understanding of the lesson, because the assigned work often seemed too difficult for their child. One mother questioned whether paraprofessionals might actually be doing her son's school work for him. Participants also voiced a strong desire to have a better sense of where their child is in terms of accomplishing grade-level goals.

The final two general themes—music and global needs—were cited by one parent each and had no matches in terms of themes and goals on the IEP. The mother of 7-year-old "Stephen" said that in her community, music ranks as high as sports in terms of small town prestige. She hopes that music will become Stephen's ticket toward receiving community praise and recognition because sensory issues relating to his disability will likely prevent him from participating in competitive sports. The addition of music instruction to Stephen's overall educational plan was particularly important to his mother. Looking beyond the classroom setting and ahead to her son's future as an adult was particularly pressing for the mother of "LaMonte," a 17-year-old who is aphasic with autistic tendencies. Locating funding to help ease him through the transition into adult life was paramount during her interview, as was the need for establishing lifelong maintenance supports for her son. LaMonte's current IEP identified no goals within that "global skills" category.

Discussion

The ethnographic interviewing method used for this study appeared at the onset to be rather laborious and time-consuming. However, the researcher was impressed by the quality and quantity of information yielded from this approach. In particular, the mothers in this study provided, from their "inside" vantage, vividly descriptive views into the home, school, and community that collectively make up the "world," as uniquely experienced by children with ASD. This is potentially invaluable information for educational team members as they consider program-planning implications for these children. A major recommendation from this project is that school districts carefully examine their methods for gathering information from the parents, given that the IEPs contained information so dramatically different from that provided by the parents.

Limitations

It is important to acknowledge several factors that may have influenced the levels of congruence found in this study. First, nine mothers identified themselves during the course of

interviews as being involved directly or indirectly with their child's school district or the educational or social services field in general. It is possible that the unusually high number of associations between participants and the educational or social services field may have increased congruence between participant and IEP goals. It is unknown whether participants were employed in these fields as a result of their child's disability or if this was a chosen vocation prior to the child's diagnosis. The employment of many interviewees or their husbands in education or social services may have improved program planning and services implementation for the child and/or educational support staff.

Likewise, direct involvement in the educational or family services field may have enhanced participants' understandings of the individualized education planning and services delivery process, in comparison to populations more representative of the general public. The mother of "Brenda," a preschooler, stated that her background in social work and early childhood development—as well as her husband's work in the mental health field—dramatically improved her ability to advocate for her child. From the terminology on her child's education plan to the types of services available to the timeline of service provisions as stated in educational law, this mother felt knowledgeable, and to her thinking, this translated into confidence in her ability to request and even push for specific components of her child's education plan.

Another factor that may have inflated congruency was that all the children in this study were being raised in two-parent homes. Comparatively, in 1998, 68% of children under age 18 nationally were living with two parents (U.S. Bureau of the Census, 1999). Having two parents in the home may have given them the time necessary to monitor their child's educational progress and program.

A third factor which potentially increased congruence of themes and goals related to the attendance of the children of three study participants in a school district that appeared exceptionally proactive with regard to autism awareness and educational needs. These parents described more involvement in IEP planning than others in the study, and the school district welcomed experts who gave feedback to both parents and school staff. This may have increased congruence because it enabled parents and school staff to have their goals influenced by the same set of experts.

A fourth limitation of this study pertains to the time lapse between the development of the IEP and the interviews for each participant. The results of this research were not adjusted according to length of time between the two, which varied between participants. It is reasonable to expect that over time, parents' educational goals for their child change and therefore may be less aligned with the IEP goals. Additionally, children's needs change as they grow and make developmental progress.

Trust

Concern was expressed a number of times by study participants about whether services identified on a child's education plan were actually being provided. Many participants expressed that they wished they could observe their child in school. Mothers appeared more trusting in general when they had open communication with the school, especially if they had a communication book that followed their child to school and home each day.

Several mothers also expressed a general lack of confidence in the scope and degree of services provided to their child. The recurring sentiment seemed to hinge on whether the parent felt the educational planning team had developed a comprehensive program that would optimize the child's functioning.

Poor staff understanding and attitudes

Some parents expressed concerns regarding a perceived lack of training in ASD by staff members who regularly worked with their children. The situations that parents gave as examples of staff lack of understanding were varied, including the school's insistence that a child remember on her own to take her medication and that another child go hungry at lunchtime if he would not eat the meal being served that day. One mother described how the staff seemed surprised at certain behaviors of her child, which she felt were hallmarks of ASD.

Another mother described how one of her son's teachers was unwilling to adapt for his condition and refused to consider her suggestions, even though she is a teacher at the same school. Predictably, to her thinking, he would spiral out of control and into tantrums in this class. There were other incidents Stephen's mother described involving teachers who similarly didn't understand autism, and she recalled numerous occasions when her son was dragged down the hall to the office, kicking and screaming in frustration.

The mother of the oldest child in this study recalled her son's earlier years, after he was first diagnosed as aphasic with autistic tendencies. Although the educators complained that they had never seen a child like her son before and didn't know how to

teach him, they repeatedly rejected her suggestions. This mother described educational team planning: "They told us, 'This is the plan. This is what we're going to do.' If we objected, we were being 'disagreeable.' We were 'not being part of a team.' They were the 'experts.' They knew 'what needed to be done.' Except, of course, if he misbehaved—and then they called me!"

Missed social skills training opportunities

Major sources of anxiety and frustration for children with ASD involve the lunchroom and playground during recess, according to mothers in this study. Continual pressure due to the demand for spontaneous interaction is highly problematic for children with ASD. Several mothers stated that their children become overwhelmed by these pressures and simply withdraw from all interaction, particularly during recess. If given the chance, they will typically gravitate toward an isolated corner on the playground. Mothers often expressed sentiments that both the lunchroom and playground during recess are missed opportunities to work on social skills in a more lifelike, casual environment, with appropriate adult prompting and support.

Implications

The method used for this study was laborious, though intentionally selected as a conduit toward a richer understanding of the parents' perspectives. The researcher was surprised to receive far more information than anticipated, and in extremely poignant examples. Another unexpected, though rather encouraging, finding was that many mothers reported enjoyable experiences in which their child displayed moments of affection, creativity, and even humor when in the familial surroundings of home. Mothers spoke of extremely strong bonds they had with these children who have rather challenging special needs. And in many instances, mothers identified areas of personal growth and enrichment as a result of rearing a child with an autism disorder. The mother of LaMonte had this to offer: "I think I'm a better person now than I used to be, because of LaMonte. I mean, they make you realize what's important in life." These sentiments were particularly encouraging, given that for many of these parents, the road ahead as advocates and caregivers of their child will be lifelong.

What was extremely disturbing in this study was that the congruence levels were so low. Even in cases where parents and schools recognized some general area of need, represented by the themes, much of the time the parents and the school were envisioning very different ways to address those general needs. Therefore, the IEP did not truly represent the goals of the parent member of the educational planning team. Yet from a life span perspective, it is the parents who have many years of concern ahead for the care and service delivery for the child with autism (Gerhardt & Holmes, 1997). ASD are developmental disabilities that are chronic in nature; it is unlikely that a child will grow up to experience total resolution of the pervasive impact of the disorder (Marcus, Kunce, & Schopler, 1997).

The participants in this study expressed several ways in which they would like educators to partner with them. Of paramount importance is the need for parents to feel valued for their more global perspective of their child. Typically, parents have been the primary caregivers of their child since infancy. "Given that the parents have spent considerably more time with the child and have more invested in the child emotionally, they can be an invaluable source of information regarding his or her characteristics and interests" (Hallahan & Kauffman, 2000, p. 532). "Today's knowledgeable educators also realize that the family of a child with a disability can be a bountiful reservoir of support for the child as well as an invaluable source of information for the teacher" (p. 536).

Parents also expressed a need for more positive contacts from the school, rather than simply being notified when there is a problem. Parents would likely respond more favorably to efforts to establish warm rapport, trust, and open communication from the very beginning of their child's involvement in the school—and certainly prior to the onset of formal educational planning team efforts.

Finally, professionals should encourage parents to make suggestions, ask questions, and express concerns, and be careful not to dismiss their ideas. For parents of a child with a chronic, pervasive developmental disorder, their involvement with their child does not end with the close of the school year, nor does it start in the fall when classes resume. Their participation needs to be encouraged and supported so that they view themselves as true partners on their child's educational planning team.

Teams with participating parents increase their ability to develop IEPs that are truly representative of all members of the educational planning team. And ultimately, with educational planning through a true collaboration framework, the optimal ingredients are in place to increase the likelihood for best outcomes involving children with ASD.

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Why Would You Remove Half a Brain?

Vanessa Melendez, *WSU McNair Scholar*
Kore Liow, *MD, Epileptologist, Via Christi Regional Medical Center-St. Francis Campus*

Imagine you're sitting on your couch watching a television program. You take a sip of your drink and place it on the coffee table. All of a sudden, your eyes roll into the back of your head. Your arms pull themselves back forcefully, and your breathing becomes fast and heavy. You don't know it, but you've lost consciousness. Everything that happens to you is beyond your control. Someone turns you on your side to keep your tongue from obstructing your airway. One minute later, it stops. You feel exhausted and your head is aching. And you have no recollection of what happened. You just had a seizure. The question I asked in my research was, "Why would you remove half a brain?" Throughout the remainder of this paper, I will answer that question.

Introduction

Epilepsy is a chronic medical condition characterized by the tendency to have recurring seizures (Merck, 1997). It is the third most common neurological disorder, after stroke and Alzheimer's disease. There are 1.5 to 2 million people in the United States who suffer from this disorder. In the state of Kansas, that translates to about 13,000-21,000 people with epilepsy. In Sedgwick County (location of Wichita) alone, the number of people with epilepsy can be estimated to be 2,250-3,600 (Liow, 2001). In most patients with epilepsy, seizures can be well controlled with suitable medication (Robb, 1975). However, current estimates show that 20-30% of patients with epilepsy are refractory to all forms of medical therapy. This means that no matter what medical treatment you give these patients, they are still plagued by constant seizures. These medically unmanageable patients are candidates for surgical treatment in an effort to acquire greater seizure control. Surgery is the last resort for patients with epilepsy. Most patients have tried everything from medication to diets, yet nothing has worked. Surgery is the next step (Cosgrove, 1998).

One of the surgeries used to treat epilepsy is called hemispherectomy. Hemispherectomy is the surgical removal or detachment of one side of the brain from the other (Silbergel, 2001). This paper examines five aspects of hemispherectomy: the definition and purpose of hemispherectomy, patient selection for surgery, evaluation to localize epileptic regions, assessment of outcome, and the future of hemispherectomy in Wichita, Kansas.

Definition/Purpose of Hemispherectomy

Walter Dandy introduced hemispherectomy in 1923. This surgical procedure was used for the removal of tumors. The operation failed and was abandoned by surgeons. However, in 1938 K.G. McKenzie first reported the use of hemispherectomy for controlling seizures. By the 1950s, hemispherectomy was accepted as very useful and effective in controlling seizures and improving behavior (Engel Jr., 1996).

There are two types of hemispherectomy. The first type is called anatomical hemispherectomy, where neurosurgeons remove half of the brain completely. There are certain structures, however, that are left intact because if they weren't, the patient would die. These include the corpus callosum, basal ganglia, thalamus, brain stem, and cerebellum. The presence of these structures keeps the other half of the brain from moving around in the skull. It is able to stay in place, while the exposed brain cavity automatically fills itself with cerebrospinal fluid. The second type, which is more commonly used, is called functional hemispherectomy. This operation removes half of the brain, leaving the frontal and occipital lobes in place (Engel Jr., 1996).

How does a surgeon decide whether to do an anatomical or functional hemispherectomy? If the patient suffers from seizures known as "drop attacks," an anatomical hemispherectomy may be out of the question. In drop attacks, the patient suddenly falls to the floor. Children who have drop attacks often wear helmets. Since the brain is more likely to move around in the skull of a patient who has had an anatomical hemispherectomy, this procedure is avoided to prevent the patient from suffering from bleeding into the exposed brain cavity. In functional hemispherectomy (see Fig. 1), the patient may still have epileptic activity in their frontal and occipital lobes, but the benefit of this surgery is that it still reduces the number of seizures that the patient has. Since the presence of the frontal and occipital lobes stabilizes the brain to keep it from moving around in the skull, the likelihood of injury to the brain is also reduced (Liow, 2001).

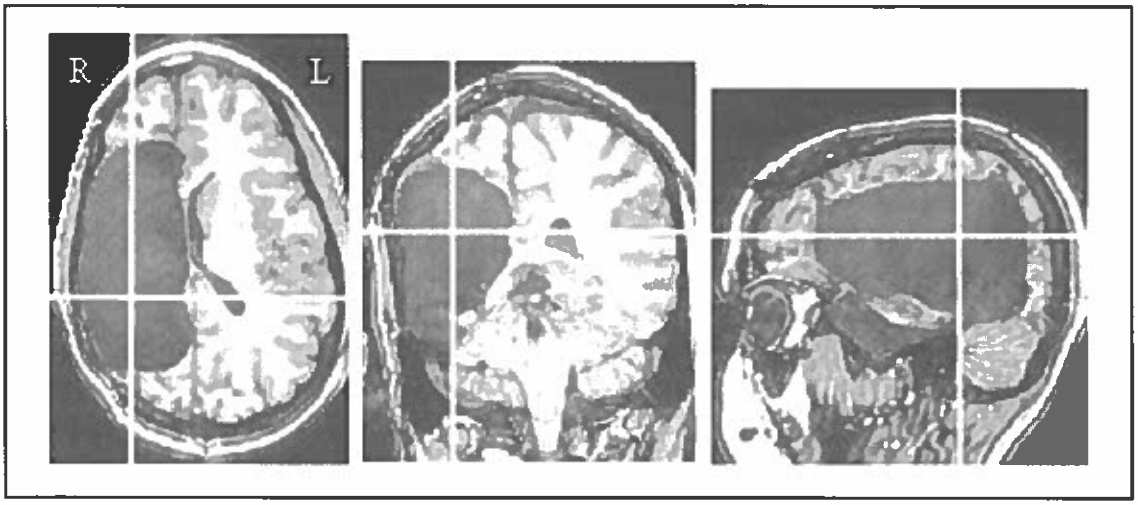

Figure 1. This patient underwent a functional hemispherectomy as seen here. In this procedure, the damaged hemisphere is partially removed, and the frontal and occipital lobes are left intact.

Functional hemispherectomy is one of the most successful surgical procedures for epilepsy, with over 85% markedly improved and about 60% seizure free (Rasmussen, 1983). The goal of hemispherectomy is to eliminate the epileptogenic zone—the place in the brain where the seizures originate. Other goals include stopping seizures completely, reversing intellectual and other functional declines, preventing the social consequences of severe epilepsy, and in some cases, preventing death from intractable seizures. The ultimate objective of hemispherectomy is for the patient to have better psychosocial development and improved quality of life as a result of seizure control (Engel Jr., 1996).

Patient Selection for Surgery

The success or failure of the surgical treatment of epilepsy depends in large part on the selection of suitable surgical candidates (Cosgrove, 1998). Patients who are eligible for hemispherectomy must have true epilepsy, rather than pseudoseizures, which are psychological or emotional seizures. A patient with pseudoseizures does not have epileptic activity in their brain (Silbergel, 2001). A detailed history and physical examination must be conducted. The type and frequency of seizures must be recorded, as well as the severity and duration of each type (Cosgrove, 1998).

Due to the frequency and severity of their seizures, patients will typically have some form of neurological deficit like paralysis. For instance, there may not be useful finger movement on one side of the body and the hand is only used as an assistor (Volkers, 1997). The patient may also limp, and foot tapping is no longer possible (Silbergel, 2001). In a case like this, hemispherectomy may be considered without the likelihood of further compromising the neurological functions of the patient (Epilepsy Surgery, 2001). A psychosocial evaluation is also extremely important to ensure realistic goals and attitudes exist in both the patient and their family prior to surgery (Cosgrove, 1998).

Evaluation to Localize Epileptic Regions

Before considerations for surgery can begin, the origin of the seizures (epileptic region) must be found. For a hemispherectomy to be done, a neurologist has to prove that the seizures originate on only one side of the brain, the "bad" hemisphere. If the patient has seizures originating on both sides of the brain, they are no longer candidates for hemispherectomy (Engel Jr., 1998). This does not mean that the patient has lost their candidacy for surgery, however. For instance, if the patient has seizures originating on both sides of the brain, a corpus callosotomy may be performed. This operation cuts the corpus callosum, the part of the brain joining the two hemispheres, to keep the seizures from spreading (Liow, 2001). In all cases, electroencephalography (EEG) and magnetic resonance imaging (MRI) are used. Additional tests are often necessary for precise location (Surgery for Epilepsy, 1990).

EEG reading involves the interpretation of brain waves largely by their frequency and shape or form (Louis, 2001). EEG testing involves placing flat disks (electrodes) on the scalp or brain. The recording machine is then able to convert the electrical signals from the brain into a series of wavy lines (brain waves). By noting the set of channels where abnormal waves occur, the neurologist is able to determine the part of the brain where the abnormality is located. Today, video EEG is used for patients

with epilepsy. Let me illustrate how this exam works. The patient has a video camera in her room at all times. She also has flat metal disks (electrodes) on her scalp which are hooked up to an EEG recording machine. All of her brain waves correspond to an exact moment in the video, like when the patient is watching television or sleeping. When she has a seizure, her brain waves reveal epileptic activity. If the neurologist suspects pseudoseizures, the EEG recording will either confirm or deny his suspicion. An EEG is the most accurate way to locate the origin of the seizures in a patient with epilepsy (The Importance of EEG Tests, 2001).

MRI is an imaging technique used to obtain microscopic chemical and physical information about molecules (Hornak, 2000). MRI can provide a three dimensional picture of the brain, making it easier to locate the epileptic regions. When trying to find the origin of seizures, an MRI is only useful if the patient has developed a tumor that is causing him or her to have seizures. Even if a tumor is not suspected, an MRI is still taken for clarification (Gould, 2001).

Assessment of Outcome

In assessing the outcome of surgery, there are risks and benefits to consider. The risks of hemispherectomy include vulnerability to minor head trauma, the development of hydrocephalus (fluid buildup in the brain), infection, and chronic leaking of blood into the exposed brain cavity. In 20 to 25% of patients who undergo a hemispherectomy, some seizures may still occur because seizures can develop in the remaining hemisphere (Engel Jr., 1996). The age of the patient will limit accurate assessment prior to surgery. This means that the patient's age will be a factor in the risks involved (Carson, 1996). Younger patients typically recover better because the earlier the hemispherectomy is done, the better the recovery of language abilities (Carson, 1990).

The benefits of hemispherectomy can be very gratifying. A hemispherectomy provides the ability to stop or reduce antiepileptic medication, while curing the patient of seizures. As a result, the patient sees an improvement in cognitive functioning and behavior, which provides relief for the family and caregivers. Thus, the costs associated with providing for some of their special needs may also be less (Engle Jr., 1998). A hemispherectomy does more than stop seizures. At Johns Hopkins Children's Center, researchers found that the patient's intelligence also increases, as they no longer have seizures interrupting their brain activity (Volkers, 1997).

Once a hemispherectomy has been done, patients are categorized in a classification known as Engel classification. There are four different classes, and they serve as an indication of how well the hemispherectomy worked. Class I is the best; patients in this class are completely seizure free. In Class II, patients are almost seizure free, experiencing only rare seizures. There is a worthwhile improvement in Class III, meaning the patient has prolonged seizure free intervals. In Class IV, the patient has remained the same (Engel Jr., 1998).

Despite the great risks of this radical surgery, it is sometimes the only viable option left. Consider the case of Maranda Francisco, a four-year-old girl who was having up to 100 seizures a day, as often as three minutes apart. Each seizure left Maranda weak on her right side, sometimes unable to talk normally for as long as two hours. She couldn't eat because the danger of choking was too great, so she had to be fed through a nasogastric tube. Although the seizures affected only her right side, Maranda was forgetting how to walk, talk, eat, and learn. Maranda tried diets and 35 different medications at one time. Nothing worked (Carson, 1990).

Neurosurgeons at Johns Hopkins Hospital decided to take Maranda's case. After reviewing her condition, she was scheduled for a hemispherectomy. Her parents were warned that she could die on the operating table. However, if they didn't operate, she would get worse and die. Doctors didn't know if her seizures would stop, of if she would ever walk or talk again. They could only do one thing—wait and see. After 10 hours of tedious surgery, the exhausted surgeons were hopeful that she would recover. But no one expected what happened next. When Maranda's parents rushed to their daughter, she fluttered her eyes open and said, "I love you, Mommy and Daddy." Surgeons had removed the left half of her brain—the dominant part that controls speech—yet she was talking! She stretched her right leg and moved her right arm—the side controlled by the half of the brain they had removed! Since her surgery in August 1985, Maranda has had no more seizures (Carson, 1990).

Maranda is able to survive without the left half of her brain because of a phenomenon called plasticity. The two halves of the brain do not depend on each other as much as we once thought they did. In Maranda's case, her seizures were damaging cells in her brain. The functions that were once regulated by a set of cells in the left half of her brain were taken over by another set of cells in the right side of her brain. In hemispherectomy, surgeons take out the half of the brain that is damaged. The damaged hemisphere no longer has any use in the body. In fact, it is the source of the patient's seizures. As in Maranda's case, it is possible to manage well with only half a brain (Carson, 1990).

Future of Hemispherectomy in Wichita

A hemispherectomy has never been done in Wichita because of the unavailability of an epileptologist—a neurologist who specializes in epilepsy. However, less than a year ago, an epileptologist joined the team at Via Christi's Comprehensive Epilepsy Center in Wichita. He is in the process of starting a surgical program, and on July 25, 2001, the first brain surgery to treat epilepsy in Wichita was performed. I was fortunate enough to observe part of this surgery. The operation they did is called a temporal lobectomy. This patient had her temporal lobe removed, since it was the only part of her brain that was showing epileptic activity.

The day of the surgery, I was excited that I would get to see a real-life brain surgery. I put on surgery scrubs, and walked into the operating room. I was immediately surprised by how cold it was. Thinking someone had twiddled with the thermostat, I asked Dr. Liow, "Is it always this cold in here?" He laughed, "Yes it is. The room temperature needs to be cool so that equipment in the O.R. does not overheat." That was not the answer I was expecting. Surgery was also not what I expected it to be. Unfortunately, it's a lot of waiting. Every procedure is done carefully and accurately. This can be very time consuming. Since I was following the epileptologist around, I was only there for the part of the surgery that he would assist with. He did the brain mapping—a procedure that places electrodes on the brain. The electrodes are hooked up to wires, and they, in turn, are hooked up to an EEG machine. From the reading, he was able to tell exactly where her epileptic activity was coming from so the surgeon knew how much of her brain to take out. (Fig. 2 illustrates this procedure.) This showed where her epileptic activity originated. Her entire temporal lobe (on the right side of her brain) was removed.

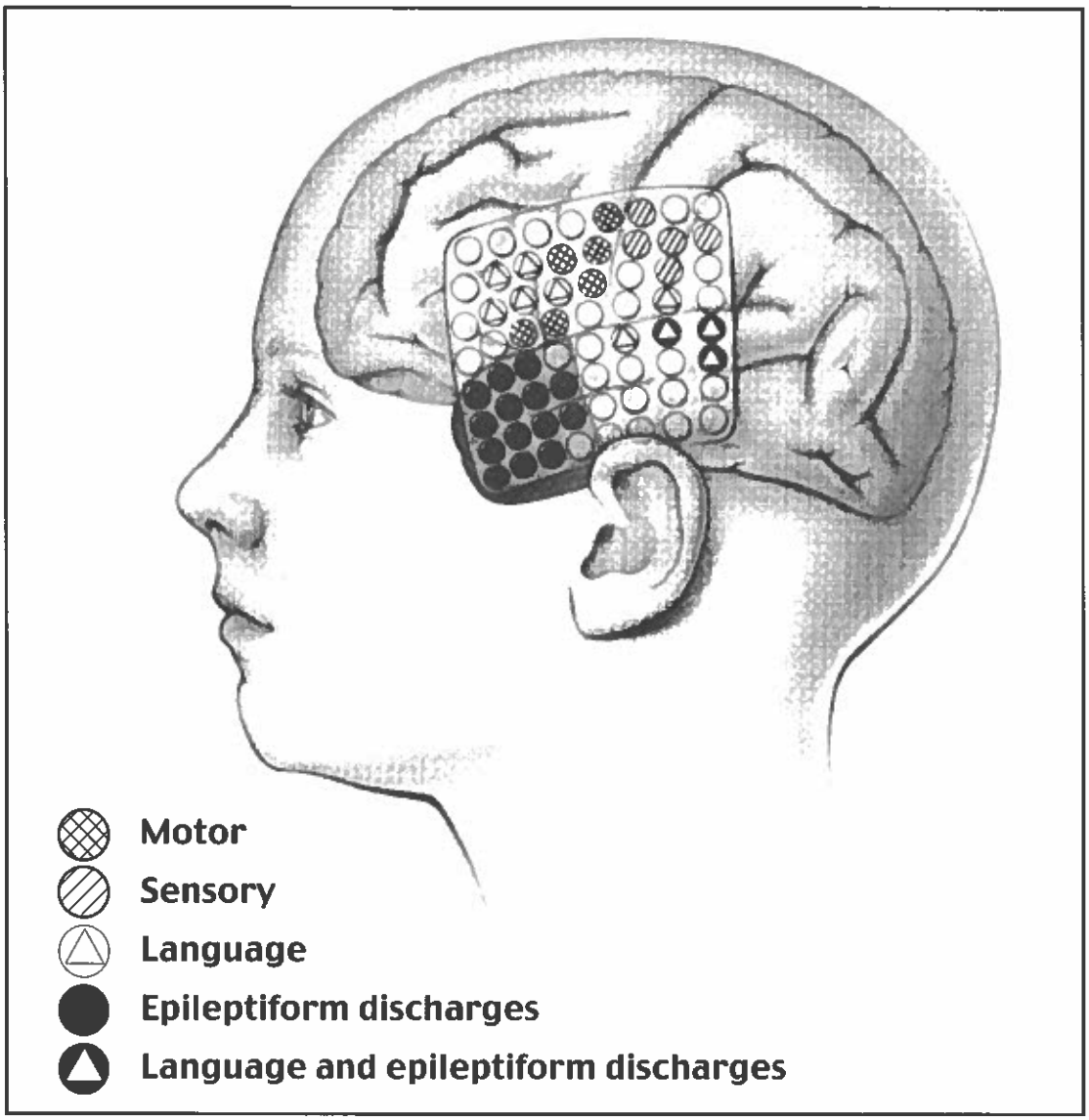

Figure 2

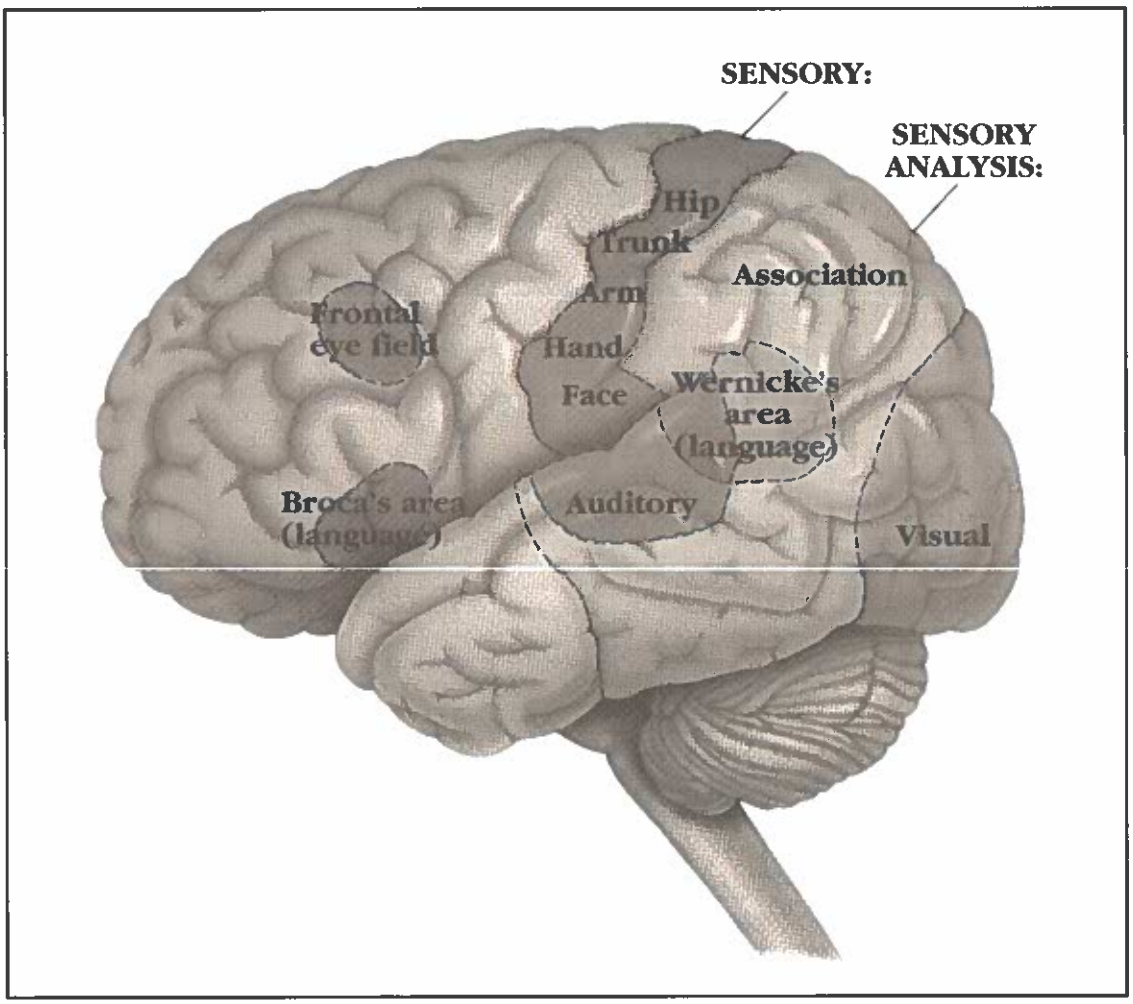

Figure 3. This figure shows half of the brain and some of its basic functions.

How can I describe the brain? It's bloody. It's intriguing. And it moves. It almost looks like it's breathing. You can see all of the pictures you want of a brain (see Fig. 3). But to actually see it in person is an entirely different experience. I was flabbergasted that one minute I was talking to the patient, and the next I was looking at her brain! Overall, the surgery lasted about nine hours. And the patient is doing very well and recovering nicely.

The epileptologist, who was also my mentor, is predicting that hemispherectomy will be available in Wichita within the next several years. This is good news for patients who have uncontrollable seizures. Considering the life-changing impact this surgery will have, I have to agree with Dr. John M. Freeman, former director of the Johns Hopkins Epilepsy Center, who said, "Half a brain that works well is better than a whole brain that is seizing constantly" (Volkers, 1997).

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Fullerene Receptor for Adenine, Adenosine, and ATP Recognition: Synthesis, Characterization, and Base-Pairing Studies

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Collaborators: *Mel Zandler, PhD; W. Kutner, PhD; and G.R. Deviprasad, PhD*

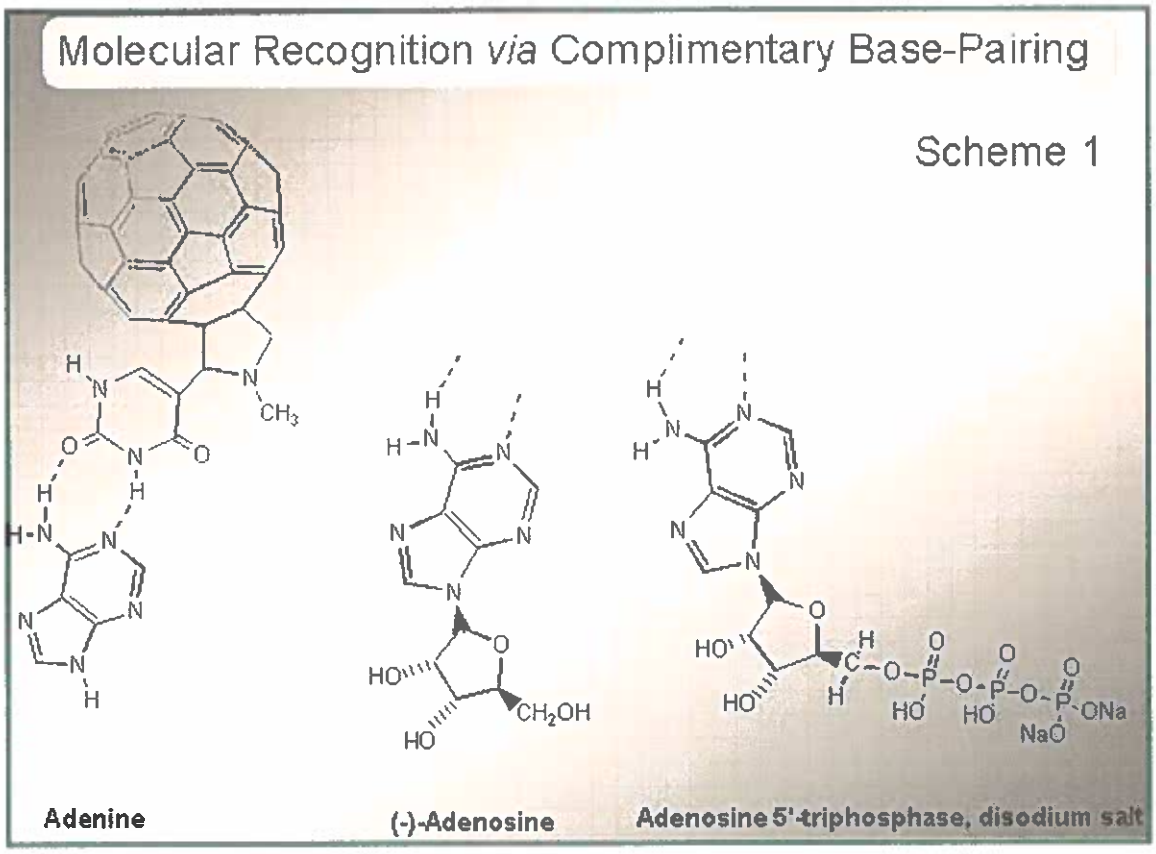
Abstract

A new fullerene bearing uracil receptor for adenine, adenosine, and ATP recognition is reported. The newly synthesized C_{60}-uracil derivative has been purified by HPLC and characterized by NMR, optical absorption, and emission spectroscopic techniques. Computational studies using ab-initio calculations at the B3LYP/3-21G* level were performed in collaboration with Dr. Zandler of the chemistry department to observe the base-pairing behavior. In collaboration with Dr. Kutner, using the Langmuir technique, the compression isotherms of surface area against area per molecule were evaluated, and the films were characterized by the Brewster angle microscopic technique. The results revealed stable complexation between C_{60}-uracil and either adenine, adenosine, or ATP at water-air interface.

Introduction

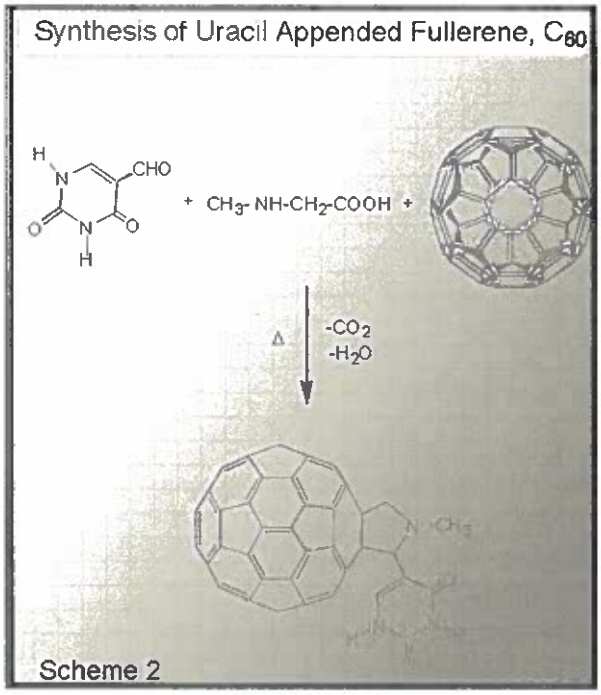
Recent studies of the biological applications of fullerenes (buckyball-C_{60}) have been focused in the field of DNA cleavage and photodynamic therapy. Fullerenes have unique characteristics such as their size, hydrophobicity, three-dimensional shapes, and electronic effects. Significant effects of fullerenes for DNA cleavage and photodynamic therapy are especially appealing given the strong ground state absorption of fullerene. Also, upon excitation, fullerenes form a long-lived triplet state of lifetime ranging between 50 to 100 μs indicating its potential cytotoxic effects. However, to make use of these novel properties of fullerene, they need to be functionalized to bear a receptor unit so that they can preferentially bind to DNA.

Here we have synthesized a new fullerene-uracil derivative, which can base-pair with adenine, adenosine, and adenosine triphosphate (ATP) at the water-air interface (Scheme 1). The newly synthesized fullerene derivative has been fully characterized by using optical absorption, mass spectroscopy, and NMR. Also, computational studies using ab-initio methods have been performed to probe the base-pairing mechanism. Using the Langmuir technique, stable, base-paired C_{60}-uracil: adenine, C_{60}-uracil: adenosine and C_{60}: uracil: ATP conjugates have been obtained and characterized by probing the compression isotherms of surface pressure (π-A) against area per molecules and Brewster angle microscopy.



Experimental Section

The methodology adopted for the synthesis of uracil-appended fullerene is shown in Scheme 2.



A mixture of 5-formyl-uracil (48 mg), sacrosine (30 mg), and C_{60} (100 mg) in 100 mL toluene was refluxed for 24 hours. At the end, the solvent was removed under reduced pressure on a rotavapor. The crude compound was then recrystallized in carbon disulfide (CS_2) and absorbed on silica gel (100-200 MESH). It was then purified over a silica gel column with 100% toluene. First unreacted C_{60} was collected and then the polarity of the eluent was increased to 8:2 toluene and ethyl acetate to collect the desired C_{60}-uracil derivative.

Results and Discussion

Figure 1 shows the HPLC chromatogram of the crude product and the HPLC purified product. The curve marked "LC-purified" shows two peaks: one accounts for the presence of the newly synthesized uracil appended C_{60} and the unreacted C_{60}. The curve labeled "HPLC-purified" consists of a single peak. C_{60}-uracil shows shorter retention time (around 10 minutes), while C_{60} has a longer retention time (17.5 minutes). The presence of C_{60} impurity is therefore eliminated from the spreading solution.

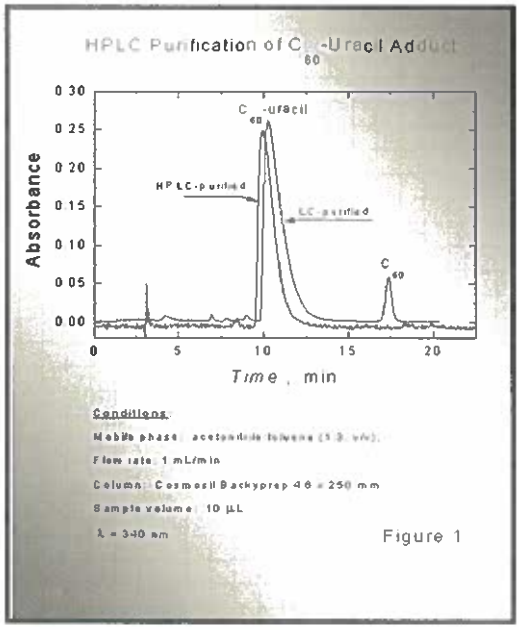


Figure 1

To further gain insights about the molecular geometry, base-pairing was studied using the B3LYP/3-21G* method. Figure 2 shows the energy minimized structure for C_{60}-uracil: adenine conjugate. The U-A distance of the newly formed bond is about 1.76 A0. This suggests the possibility of base-paired conjugate formation.

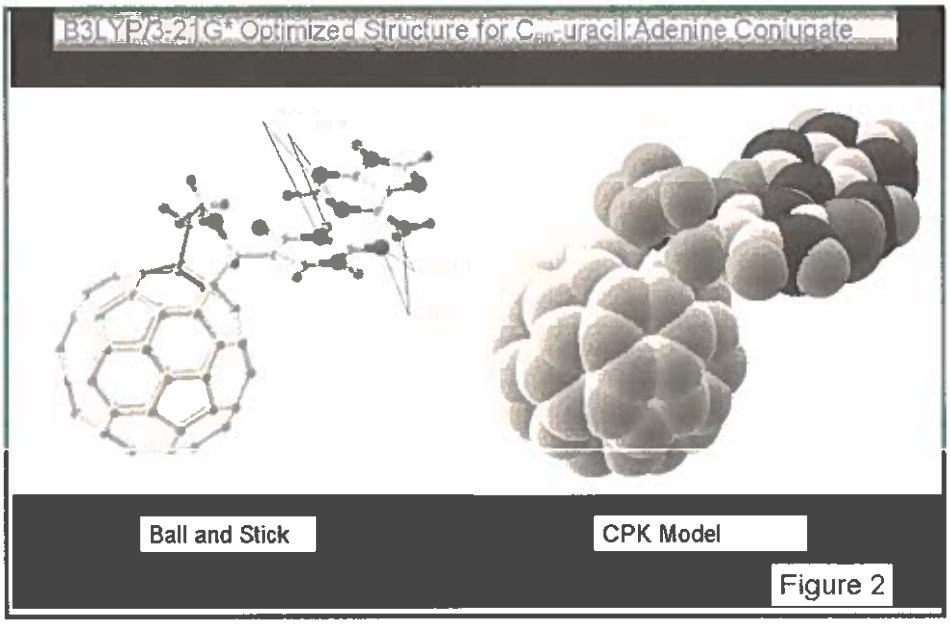


Figure 2

Figures 3 and 4 show the Langmuir studies performed by monitoring the compression isotherms of surface pressure (π-A) against area per molecule for four different subphase solutions (water, adenine, adenosine, and ATP) in the presence and absence of complementary bases in aqueous phase. The π-A values of isotherms are significantly larger for adenine, adenosine, and ATP in subphase solution than to that for the water subphase.

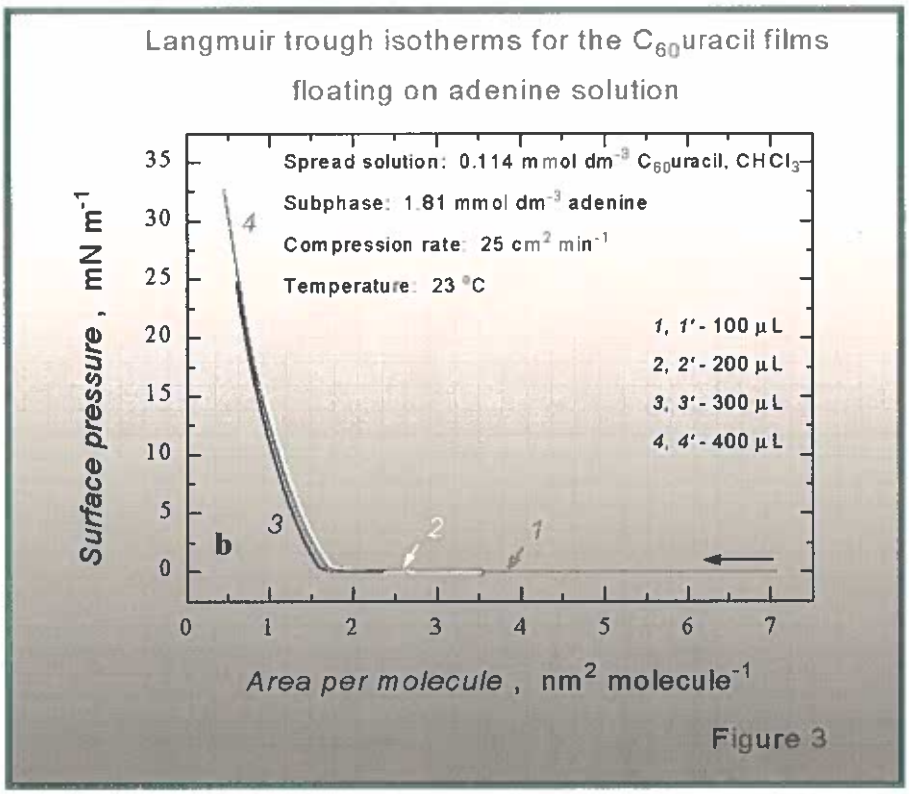


Figure 3

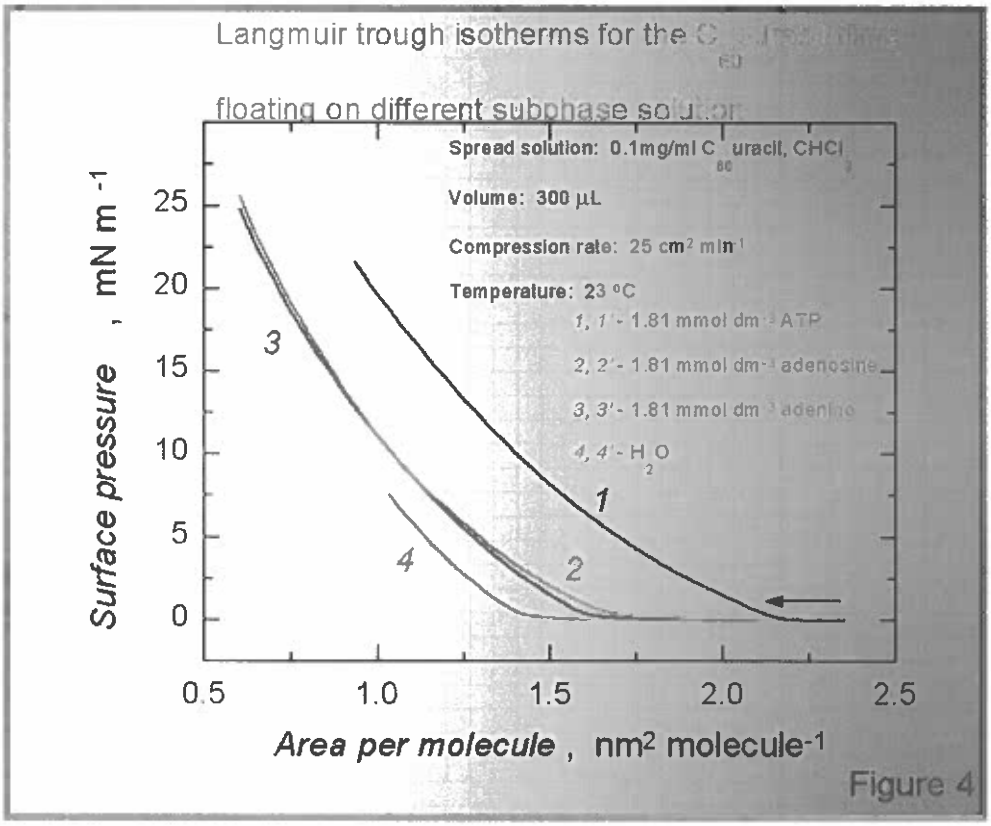


Figure 4

The data presented in Tables 1 and 2 and the Brewster angle microscopy images shown in Figure 5 and 6 confirm stable conjugate formation at the air-water interface. The dipole moments (D) values increases for subphases in order: water, adenine, adenosine, and ATP.

Table 1: Parameters of the Langmuir through π-A isotherms of the C_{60}-uracil films on adenine solution

Spread Volume (mL)	A_0(π-A) nm² molecule⁻¹	κ m mN⁻¹	µD
0.10	2.28	1.014	1.40
0.20	1.48	0.023	1.29
0.30	1.18	0.020	1.30
0.40	1.18	0.019	1.23

A (C_{60}-uracil:adenine) = 1.19 nm2; estimated (HYPERCHEM) area of the complex

Table 2: Parameters of the Langmuir through π-A isotherms for films of C_{60}-uracil floating on different subphase solutions

Subphase	A_0(π-A) nm² molecule⁻¹*	κ m mN⁻¹	µD
H_20	1.32 (1.19)	0.028	0.63
ATP	1.64 (1.57)	0.020	1.45
Adenosine	1.14 (1.44)	0.018	1.75
Adenine	1.18 (1.19)	0.020	1.30

*The numbers in parenthesis represent area of the complex estimated from HYPERCHEM program.

Figure 5

Figure 6

In summary, these studies demonstrate formation of stable C_{60}-uracil: adenine conjugate. The computationally determined hydrogen bond formation suggests the possibility of base-paired complexation. The Langmuir studies indicate stable conjugate formation at the air-water interface. In this particular research, I have learned how to synthesize various fullerene-derivatives and characterize them. Learning how to use chemical instruments such as 400 MHz NMR, electrochemistry, and UV-visible spectroscopy has become my motivation to advance the concepts to the higher level of understanding of how certain molecules function. Further studies will be conducted. We plan to synthesize C_{60}-derivatives bearing thymine residues in order to perform base-pairing studies.

Towards the Application of Artificial Proteases to Proteome Analysis by Mass Spectrometry

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Proteomics is an experimental approach used to reveal the structure, function, and control of many biological pathways and biochemical processes. The proteome consists of the protein equivalent of an organism's genome. As scientists continue to sequence genomes in order to understand cellular function on the molecular level, we have come to understand that there is much more to comprehend concerning gene function than was originally taken into consideration. Biochemical activities of specific proteins may add a more translucent perspective on the function of genes.

In order to analyze the proteome, however, we must first separate and observe the many proteins that are expressed under a certain physiological state, and then go on to identify and quantify each protein. Through the advancement of two-dimensional gel electrophoresis (2D-GE), used for separation, visualization, and quantification, and mass spectrometry (MS) for protein characterization, the evolution of proteome analysis has made immeasurable progress. One of our research interests involves the development of new methodology to assist in the process of protein identification using mass spectrometry.

Peptide mass mapping is an MS approach used to identify proteins through the use of natural enzymes that generate numerous sets of peptide fragments from a protein. Because each protein contains an individual and unique sequence of amino acids, the number of peptide fragments generated by a digest, as well as their specific masses, are also unique to a given protein. The peptide fragments identified by MS are hypothetically compared to fragments from a digestion of sequenced proteins found in computer databases. However, several problems to such an approach have been revealed, including post-translational modification, complex changes to the masses of peptide fragments which can only be partially simulated within the protein database, and the varying efficiency of the enzyme digestion itself.

It is for this reason that we have chosen to explore synthetic alternatives to trypsin for mass mapping experiments. Our own approach will use cleaving agents based on transition metal ions, which are much less sensitive to the complex folded structure of many proteins, more stable over a wide range of pH and temperature, and able to use hydrophobic interactions to reach those sequences that are not exposed to the solvent. Our initial focus has been on palladium (Pd) ligand complexes, which have been shown to cleave peptides and proteins at the amino acids histidine and methionine. The proposed mechanism for cleavage in solution involves anchoring of the Pd histidine's imadazole ring, followed by direct attack by a water molecule of the amide bond involving the histidine's carbonyl group. To design optimal metal/ligand complexes for efficient amide bond cleavage, we must first procure details regarding the intrinsic or "gas phase" interactions between metal ion/ligand and peptide. Gas phase experiments have shown to be well suited for such analysis as reactions and mechanisms are probed in the absence of solvent, producing data on the straightforward and fundamental chemical interactions involved in the binding of metal ions and the activation of certain bonds.

Up to this point gas phase complexes containing Pd, an alanine ligand and the peptide, have already been generated by electrospray ionization and interrogated by collision induced dissociation (CID). Experiments in an ion trap mass spectrometer and data concerning their efficiency will be reported in future publications.

The Role of Wheat Bran in the Prevention of Colorectal Cancer

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Socrates was correct when he made the statement "let medicine be thy food and food be thy medicine." There is evidence that wheat bran not only plays important roles in areas such as weight control, neural birth tube defects, and chronic heart disease, but it also contributes greatly in the prevention of colorectal cancer. Clinical studies have shown that individuals who consume diets high in wheat bran fiber have a lower incidence of colon or rectal cancer than those who do not. For example, researchers have found that colorectal cancer risk decreased as wheat bran consumption increased (Earnest, Einspahr, & Albert, 1999). Various experiments using laboratory rodents provide evidence that wheat bran has several beneficial effects such as a better dilution potential, a faster transit time through the colon, and the ability to ferment long chain fatty acids to short chain fatty acids.

Dietary wheat bran dilutes carcinogens, procarcinogens, tumor promoters such as long chain fatty acids, bile acids, and ammonia into a bulky stool which reduces absorption by colonic mucosa. Reddy (1989) conducted an experiment using male Sprague-Dawley rats. For three weeks, the rats were fed the same amounts of pectin, guar gum, oat bran, cellulose, wheat bran, and a no fiber diet along with a nonabsorbable biomarker (chromic oxide). After three weeks, the biomarker was measured in the cecum, proximal colon, and distal colon. The no fiber diet had the worst dilution potential followed by the pectin, guar gum, oat bran, cellulose, and wheat bran.

Another area in which wheat bran is beneficial is its ability to provide a faster transit time through the colon region. Reddy's (1989) research with Sprague-Dawley rodents found evidence of a faster transit time. A radiopaque biomarker was surgically implanted into the rats. Every fifteen minutes radiographs were taken as the biomarker traveled through the three colonic regions. The no fiber diet had the worst transit time followed by cellulose, guar gum, pectin, oat bran, and wheat bran. The wheat bran had the best transit time through the colon.

Wheat bran also has the capability of fermenting long chain fatty acids to short chain fatty acids. It was once hypothesized that butyric acid, which is a short chain fatty acid found in large quantities in the distal colon, inhibited tumor growth. This hypothesis was proven wrong by feeding laboratory rodents oat bran and wheat bran (Reddy, 1989). Sprague-Dawley rodents were fed an oat bran diet and a wheat bran diet for 16 weeks. They were also injected with azoxymethane (AOM), a colon specific carcinogen used to promote tumor growth. The rats consuming the oat bran diet had a significantly higher butyric acid concentration in every part of the colon than the rats fed wheat bran. The incidence of tumors was significantly lower in the rats fed wheat bran compared to oat bran fed rats.

Various studies have provided evidence that wheat bran has a better dilution potential, a faster transit time, and the ability to ferment long chain fatty acids to short chain fatty acids. These results indicate that wheat bran contributes greatly in the prevention of colorectal cancer in laboratory rodents and possibly in humans as well. Investigators from the American Institution of Nutrition estimate that the risk of colorectal cancer could be reduced by nearly 31% if the consumption of wheat bran fiber intake was increased to 13 grams per day (Adams, 2000). Further research is currently under way to determine if different varieties of wheat provide various levels of protection against colorectal cancer in laboratory rodents.

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Some Problems for McDowell's Criticism of Davidson's Theory of Knowledge

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In a series of recent writings, Donald Davidson, one of the most influential living philosophers, has developed a very sophisticated theory of knowledge that attempts to characterize what knowledge is, what justifies theories, and what makes such justification possible. Davidson's theory, however, has generated much controversy in the philosophical community and has not been without his critics. One of the most influential critics of Davidson's position is John McDowell. In several writings, McDowell argues that Davidson's account of knowledge is fundamentally flawed. However, McDowell's arguments against Davidson's theory of knowledge make substantive assumptions about the nature of language to which Davidson does not subscribe. Rather than attacking Davidson's claims about knowledge directly, a better strategy for McDowell would be to undermine the account of language on which Davidson bases his theory of knowledge.

Because Davidson's theory of knowledge is an extension of his account of language, familiarity with his views about language is essential to understanding his claims about knowledge. In his theory of language, Davidson adopts a third-person perspective. This means that he thinks that anything important or interesting about language, from a theoretical perspective, is going to be publicly shared and observable by more than one person. Such an emphasis on intersubjectivity is also practiced in the natural sciences, in which the phenomena observed by a scientist can be observed by other scientists and the results of an experiment can be confirmed by other scientists as well.

To emphasize the social dimension of language that he feels is so important, Davidson employs a thought experiment involving a radical interpreter. A radical interpreter is an individual attempting to understand an unknown language without the aid of translators, translation manuals, foreign-language dictionaries, and the like. Such an interpreter would try to understand utterances of speakers by correlating their utterances with the conditions in the environment that prompt such utterances. For example, if a speaker utters "Gavagai!" as a rabbit runs by, then the radical interpreter might interpret "Gavagai!" to mean something like "There goes a rabbit!" For Davidson, the example of the radical interpreter highlights the public dimension of language use because it demonstrates that those objects and events (e.g., rabbits) that give utterances (e.g., "Gavagai!") their meanings are observable by more than one person: because the rabbit could be seen by both the radical interpreter and the speaker, the speaker's utterance could be successfully understood by the radical interpreter.

When McDowell criticizes Davidson's position, he attacks Davidson's claims about knowledge but does not address the intimate connection between Davidson's views of language and knowledge. This is a mistake that vitiates McDowell's arguments because such arguments presuppose theses about language that Davidson would contest. In particular, McDowell does not adopt the third-person perspective on language that Davidson does. In reply to McDowell's criticisms, then, Davidson can simply claim that the arguments are invalid because they are based on an incorrect account of language. By failing to attack Davidson's account of language, McDowell thus compromises the cogency of the considerations he raises against Davidson.

Rather than attacking Davidson's claims about knowledge, McDowell first needs to undermine the account of language that underpins Davidson's theory of knowledge. Davidson adopts a third-person perspective on language that carries important implications for his theory of knowledge. As long as McDowell fails to address the adequacy of Davidson's account of language, his arguments are ineffective and only beg the question. Shifting the focus to Davidson's theory of language may or may not ultimately prove Davidson's theory of knowledge to be unsatisfactory, but at least criticisms of Davidson will be directed at the facet of Davidson's position that most needs to be evaluated to assess the validity of his account of knowledge.

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Improving Indian Education through Cultural Awareness

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Non-Indian parents and communities in America have always maintained control over their children's education through elected school boards whereas Indian parents and tribes have historically been denied this right (Vogel, 1972). For various reasons, federal, state, and private agencies have basically assumed control over the education of Indian children. With many Native languages and traditions near the brink of extinction, access to education can be used to help preserve rather than replace Indian traditions. For Indian people, the link between education and culture is fundamental and cannot be stressed enough as they struggle to maintain their identity.

Native cultures and languages are quickly moving from the center of Native American existence to the outer boundaries (Darder, 1991). In a time when Indigenous Nations are reclaiming history, identity, and culture, many people's eyes remain on the dire need to resist social, cultural, and political change imposed by the dominant society which surrounds the tribal and cultural borders. Only by holding to their own beliefs, values, and actions will Native Americans begin to overcome the quest to render the Indigenous Nations invisible.

With attempts from the outside to eradicate Native culture and language, it is crucial to explore and highlight those ways in which Native culture and language can be incorporated into education. Working to create educational processes and opportunities in which Native cultures are at least equal, if not primary, gives those cultures a chance of survival.

The movement toward incorporation of language and culture in school curricula emerges from a tattered educational history (Vogel, 1972). This history shows how the use of Native languages and cultures in the curriculum falls on a continuum where English-only instruction and policy to language and culture are being used only as a means to achieve an ultimate goal of assimilation. All along this continuum, the goals are dictated by the dominant society.

In terms of cultural appropriate education, the contradiction lies in who determines the purpose of education. Since formal schooling is the arena in which culturally appropriate education needs to take place, the ultimate purpose of that education tends to remain assimilation into the dominant society. Further, major shifts in the history of Indian education are the result of investigations initiated by the federal government. The Meriam Report (1928), Kennedy Report (1969), The National Advisory Council on Indian Education (1974/5), and President Clinton's Executive Order 13096 (1998) are all reports which gather data about Indian children and measure that evidence with the criteria set by the dominant society.

Culturally appropriate curriculum requires that educators implement culturally appropriate ways of teaching and learning throughout the entire day (Yon, 2000). This means that language is not taught only one hour a day, but it is taught and used throughout the entire school day. And it also means that aspects of cultural knowledge, such as Native history, science, and philosophy, are all incorporated into what is taught in schools. In order to understand, create, and implement culturally appropriate curriculum, teachers need to be "educated" to do so. Teacher education programs and courses that model this kind of teaching are needed to train teachers to understand, develop, and implement culturally appropriate curriculum in schools serving Native students. In this way, both Native and non-Native teachers can be trained to develop and implement culturally appropriate curriculum serving Native students. Since schools do not exist in a vacuum, parents and community members need to be interviewed about their understandings of what is culturally appropriate teaching and learning. Schools and communities need to come together to design, implement, and support such programs.

The success of any educational reform effort, such as culturally appropriate curriculum being implemented in schools serving Indian children, often depends on federal funding allocated by Congress or Bureau of Indian Affairs (BIA) or the Office of Indian Education (OIE). In the end even curriculum is controlled—whether directly or indirectly—by agents of government, not by Native people or by their communities. Those who provide the money have the control; if tribes fund programs, they regain control over the purpose, curriculum, and pedagogy of such programs.

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Demographic and Psychological Dimensions of Voting and Non-Voting Young, Latino Adults

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This study measures and predicts political participation in young, Latino adults. The research addresses the following questions: what motivates this age group to vote, and if they are not voting, what are the reasons? To conduct the study, results from a recent telephone poll administered by the William C. Velasquez Institute were analyzed. Four hundred thirty-six Latino individuals ages 18 to 24 participated in the poll. Results suggest that individuals who demonstrate knowledge about and interest in political issues are more likely to vote. Furthermore, many of the participants indicated that they do not vote. A review of current literature supports these results. Significant concerns arise as the trend to disengage from political involvement appears to be increasing in young, Latino adults.

According to the U.S. Census Bureau, Latinos' voting record is phenomenally increasing and is the fastest growing voting block today. In the 1996 presidential election, Latinos were responsible for 72 percent of the group vote that re-elected President Bill Clinton. Latinos constitute 32 million of the United State's total population. This population is growing ten times faster than the white population and six times faster than the general population (U.S. Census Bureau). Clearly they are a powerful group to contend with. However, not all Latinos are actively taking a role in the voting process. Young adults in general are not apt to vote, and this research specifically measures the political participation of young, Latino adults between the ages of 18-24, which constituted seven percent of this particular poll (206 females/230 males).

Latino youth political activism has greatly diminished since the Chicano Movement, which was steered by Mexican students. With the ratification of the 26th Amendment in 1971, which lowered the voting age to 18 years old, there was great hope and enthusiasm for the younger generation of the nation. Many hoped that young people would share a greater voice in American democracy. Sadly, these great expectations have only been met with declining political participation among youth. The voter turnout rate of 18 to 24 years old has steadily declined since 1972 at nearly a 20 percentage point decrease in voting (nass.org/nass99/ sect1.html). Although this disenchanted generation is a volunteering generation, many are civic-minded without being political. While they show hope and charity, they possess little faith in conventional politics. They get involved in issues and grassroots organizations and care about local and statewide issues; however, political parties are seen as something their parents did (Andrade 2000; Dionne, 2000). In this research, only 42 percent of "eligible" young, Latino voters, ages 18 to 24, were registered, which left a huge chunk of 57.8 percent not registered to vote. The interesting twist here is that really only 23 percent of the young Latinos are not registered to vote because the other 34 percent are not even eligible to vote due to non-citizenship (Velasquez, 2000). Of those registered, 48.9 percent reported that they always vote and 23.1 percent reported that they sometimes vote.

This research provided evidence that of the Latino young adults who do vote, they are more likely to do so because the have found personal relevance in reference to their psychological engagement. For example, the Latino young adults who attend college and are concerned with issues such as financial aid and affirmative action tend to be drawn to the voting booth. Also, exposure to political discussions and messages in a nonpolitical setting such as a college campus provides stimulus for political activity. Clear political interests promote involvement, therefore, exposure and discussions regarding pertinent issues may encourage participation in the voting process.

What was most evident in this study was that young Latinos vote because of psychological engagement and personal relevance on the issues most important to them. The "issues" and the attention paid to young people as a voting constituency are what matter in the voting process. Pandering to young people is not a solution; however, addressing their concerns is critical. Further research is warranted.

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Environment: A Determinant and Perpetuator of Substance Abuse

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Environmental factors such as family, friends, income level, sex roles, and socialized beliefs regarding the use of drugs "drive" the addiction process and impact the recovery process. The majority of substance abuse research has been conducted by examining the relationship between alcoholism and genetics. The disease and genetic components of drug addiction is acknowledged in this research; however, environmental influences and situations involving family and friends are emphasized. This research is a continuation of a previous study in which the primary variable tested was stress and drug use as a means of coping. The focus of this current study is on the influence of family and friends in the development of substance abuse in adolescence.

Family influences have been implicated in substance abuse. The individual who grows up in a substance using household may be predisposed for drug use later in his or her life (Adger, 1991:21-22). As moral values and beliefs are being shaped in children, the habits of parents and siblings clearly have an impact on adolescent substance abuse. In addition, peers have powerful influences on the lives of impressionable youth: "Older peers who smoke, drink, or use other substances may suggest to younger peers that these behaviors are not only acceptable but also necessary to achieving popularity" (Brown, 1990:10:16-19). Family and peer modeling initiate and perpetuate dependence on drugs. This modeling is done in many ways without the knowledge of parents and peers. Seldom does a family member or friend, particularly while mentally impaired from the influence of alcohol and other drugs, realize that their behaviors and attitudes are having a direct impact on the impressive minds of adolescents. The modeling becomes conditioned responses to what is believed to be acceptable practices for the observers.

To gain information regarding environmental influences on adolescent drug use, a survey was administered to 53 participants residing at three different treatment facilities in Wichita, Kansas. All participants were diagnosed substance dependent. There were 38 men (mean age of 36.5) and 15 women (mean age of 34.9) who completed the survey. Some of the information gathered in the survey included drug use by family members, number of using friends, and drugs offered to the individual by family members and friends. Other descriptives that were included were number of previous treatments and profiles of drugs used. Of the 53 participants, 45% reported that the family had the strongest influence on drug use, and 74% reported that friends had the strongest influence on their decision to use drugs.

Statistical significance was not found in this study regarding substance abuse and the influence of friends and family; therefore, the results confirm that the comorbidity of substance abuse assures us that no one single variable will be responsible for dependence. Another conclusion that may be drawn is that friends may present a stronger influence than family in the initiation of drug use.

Assessing environmental factors that contribute to the addiction and relapse processes is critical in discovering and providing different approaches to treatment. It has become increasingly necessary to appraise the environment and facilitate changes that are conducive to long-term abstinence in treating drug addiction. The process of addiction is comorbid, and treatment has to be approached from a holistic perspective. However, by isolating strong variables within the environment such as family and peer influences, more efficacious treatments for intervention and prevention can be developed and utilized in the treatment of substance abuse.

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Effectively Managing Diversity in the Workplace

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In the past 20 years, the nature of the American workforce has undergone many changes. Census information indicates that African Americans are the largest minority ethnic group in the nation, with a total population of 36.4 million people. African Americans are increasingly tech-savvy, own more businesses than ever, and live in affluent enclaves unknown to most marketers. Latinos, with a population of 35.3 million people, now comprise 12.5% of the total U.S. population. This is a 58% growth rate within the last decade. Mexican Americans are the largest ethnic group among the United States Latinos, followed by Puerto Ricans. Asian Americans are the third largest minority group, with 10.2 million people. Gays/Lesbians are estimated to be from three to ten percent of the U.S population. Women now account for 46.6% of the workforce and hold almost half the managerial and leadership positions in Fortune 500 companies (DiversityInc.com, 2001). These changing demographics as well as the globalization of the economy have changed the marketplace immensely. Corporations must not ignore the benefits of effectively managing diversity in the workplace if they want to keep their positions as top economic powers in the world.

According to Roosevelt (1996), diversity is defined as any mixture of components characterized by and encompassing both differences and similarities. The mixture surfaces when two or more entities come together to try to accomplish corporate goals. Diversity has always been present in the workplace. However, corporate leader's methods in dealing with diversity have not always been acceptable or effective. Thomas' book, *Redefining Diversity* (1996), suggests the use of a Diversity Management Process. There are four steps involved in this process. First is to analyze the problem, then analyze the elements within a certain set of circumstances. Third is to analyze the tension that exists among the corporation's workforce. Fourth is to review the problem and decide on the course of action with continuous monitoring to assess how well the chosen approach is working. According to Thomas (1996), if the chosen approach doesn't work, then an "Eight-Step Action Paradigm" can be implemented. Paradigm is a way of thinking that facilitates diagnosis, understanding differences, and action planning. This paradigm consists of ways that can be implemented to address different diversity issues. Currently, managers have few options to handle diversity problems. Affirmative action policies have not aided corporations in addressing diversity issues.

In this study interviews were conducted with people holding various positions within The Boeing Company (Wichita Division) and Wichita State University (WSU) in order to better understand the diversity issues within these workplaces. Two questions were asked: (1) What diversity management process is being used in your establishment? and (2) How effective do you think this method is? According to one Boeing respondent, his company uses Roosevelt's prescribed Diversity Management Process including a combination of teaming, strategic diversity management, and understanding differences. Although it has been a long process, Boeing is moving in the right direction. The people at WSU think that there isn't a good understanding of diversity differences, and there is no effective management of diversity. Affirmative action planning and diversity management tools are being used at WSU to address these issues but many feel that these are not effective tools.

In conclusion, the Eight-Step Action Paradigm was found to be one of the most effective tools used in managing diversity today. It is an effective template for analyzing and the best course of action for dealing with diversity problems. The interviews conducted show that companies are attempting to find better ways to deal with its workforce. The bottom line is if corporations do not embrace the idea of effectively managing their diverse workforce, they will become "corporate dinosaurs" and quickly become extinct.

How a Person's Beliefs about the Nature of Knowledge Affect Receptiveness to Complementary/Alternative Health Care

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In recent years, there has been a growing awareness in the U.S. that alternative forms of medical treatment may be as successful in addressing certain chronic illnesses (e.g., migraines) as traditional Western methods. From almost mainstream treatments such as chiropractic and osteopathic to more esoteric methods such as aromatherapy and reflexology, Americans are being offered a virtual smorgasbord of alternative/complementary health care practices. What influences people to try these methods even if their HMO or allopathic doctor objects? Many factors come into play such as curiosity, hype in the media, dissatisfaction with the results of traditional treatment, and some more subtle reasons—often psychological. For example, a person's beliefs influence feelings, motivations, and actions in everyday life, and these beliefs may affect his or her willingness to try a different mode of health care. This research addresses two questions: (a) what are the participants' epistemological beliefs (beliefs about the nature of knowledge and how it is acquired); and (b) is there a relationship between a person's personal epistemological beliefs and his/her willingness to try a complementary form of health care? The assumption in this study is that personal epistemological belief systems have a subtle influence on decisions made in daily life.

The participants in this study were 80 people of different ages, races, and educational levels chosen at random. A two-part survey was administered. The first part is an epistemological questionnaire developed by psychologist Marlene Schommer-Aikins (1990) from her previous research on this subject. Schommer's questionnaire employs four hypothesized epistemological beliefs. Stated simply, these beliefs about knowledge are the following: (a) Structure of Knowledge—ranging from "knowledge is organized as isolated bits and pieces" to "knowledge is organized as highly interwoven concepts"; (b) Speed of Learning—ranging from "knowledge is acquired quickly or not at all" to "knowledge is acquired gradually"; (c) Ability to Learn—ranging from "the ability to learn is fixed at birth" to "the ability to learn is flexible and subject to change"; and (d) Stability of Knowledge—ranging from "knowledge is absolute" to "knowledge is tentative." Participants rated statements about these items on a scale from one (strongly disagree) to six (strongly agree).

In order to examine the relationship between epistemological beliefs and attitudes towards complementary therapies, the second part of the survey asks for basic information such as age, race, gender, level of education, and experience with 18 common complementary/alternative health care practices. Complementary/alternative practices were classified into six major categories: (a) Doctor Therapy (chiropractic, osteopathy, and Chinese medicine); (b) Oldest Therapy (acupuncture, yoga, and prayer); (c) Hand Therapy (healing/therapeutic touch, aroma therapy, massage therapy); (d) Earth Elements Therapy (copper jewelry and crystals); (e) Ingested Therapy (nutrition, herbs); and (f) Mind Therapy (chanting, imaging, hypnosis). To assess experience with alternative medicines, the following rating system was used: 0—would never consider trying it; 1—have never really thought of it; 2—have considered trying it; and 3—have tried it. Participants were also asked if they were satisfied with the results of their therapy, would they try it again, and if their doctor approved of them trying it.

In this study, patterns of beliefs and use of alternative health care practices were examined. It was found that "combining ideas," "looking for details," and "learning is gradual" predicted the use of Doctor Therapies. There were two predictors for Ingested Therapy: "understanding things deeply" and "learning can be improved." In previous research by Schommer (1990), belief in "complex knowledge" and "the ability to increase learning" predicted careful judgement for one's health care. In contrast, the only predictor of Oldest and Earth therapies was "get to the details" without seeking further information, which suggests minimal sophisticated epistemological thinking. The one predictor for Mind Therapy was the belief in the "uncertainty of knowledge." Previous research (Chandler, Boyles, & Ball, 1990) provided evidence that individuals who have extreme beliefs in the uncertainty of knowledge may overreact as an extreme skeptic, and they don't believe in anything, or they're dogmatic and will hold on to some unique idea as if it was written in stone. None of the variables including demographics of age, education, or epistemological beliefs predicted Hand Therapies. Demographic variables predicted Doctor Therapy, Ingested Therapy, and Oldest Therapy, and none of the demographic variables predicted Earth or Mind Therapy. The implications are that epistemological beliefs, which are influenced by education, parents, and culture, influence people's choices of therapies.

The limitations of this study are small sample size, limited choices for alternative medical therapies, and limited diversity of the sample. Although zero order correlations between therapy types and personal epistemological beliefs were found, discussion is still a bit speculative.

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Bird Strikes and Low-Velocity Impact on Composite Structures

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Collisions between birds and aircraft have occurred ever since the first few years men have been able to fly. The first ever-recorded incident was in April 1912, in California. Calbraith Rogers flew the aircraft, and when he hit a California gull, the plane crashed and Rogers was killed (Tedrow, 1999). Collisions with birds have made aircraft nonfunctional, thus creating significant dangers to the pilots flying them. As the number of aircraft began to grow, so did the number of bird-to-aircraft collisions. According to the United States Air Force (USAF) and the bird aircraft strike hazard (BASH), between 1974 and 1997 there were 45,965 bird strikes to USAF aircraft alone (Tedrow, 1999). During this time, bird strikes accounted for $209 million in damages. The need for better materials to cover the outside of the aircraft is pertinent. While bird and aircraft collisions cannot be altogether prevented, the materials can be strengthened to withstand impacts and allow the plane to land safely in order to repair the damage.

In attempts to minimize the danger of bird and aircraft collisions, varying materials have been researched for the purposes of building a stronger aircraft structure.

Aluminum is used on many aircraft today; however, when structures are made with aluminum and a bird impact occurs, the materials suffer more extensive damage and are considerably weaker than if they were made with composites, which are fiber reinforced and woven materials capable of different orientations. Researchers provide evidence that composite materials are more effective in withstanding great amounts of pressure. Polymer-matrix composites are highly resistant to fatigue, and they are lightweight. Composite materials enable a structure to be built with fewer pieces than with aluminum, thus, reducing the cost over time. A more durable, lightweight, and cost-effective aircraft may be built with composites.

An example of an aircraft in which the use of composite material has been successful is the Dash-8. The Dash-8 is a twin turboprop aircraft that flies at altitudes where bird strikes frequently occur. The previous design of the Dash-8 had a metallic wing structure and a leading edge (the front part of the wing structure that is susceptible to bird strike impacts) that was covered in aluminum. It was found that numerous bird strikes weakened the structure, and the design had to be changed. The FAA regulations require that the leading edge of the aircraft must be able to withstand an impact of a bird that weighs four pounds while flying at an altitude of 8,000 feet and at a speed of 283 miles per hour. In order to create a structure with as minimum weight as possible and to withstand pressure from a bird collision, a honeycomb sandwich structure was used. A honeycomb structure is a hexagonal shaped inner layer placed in between two surface plates. The honeycomb structure provided an adequate amount of stiffness and the weight of aircraft was minimized; however, the honeycomb structure was inadequate because there was not enough strength in the transverse shear to withstand the loads produced by bird impacts. To alleviate this problem, a composite material with Kevlar fibers was introduced. Kevlar, a material often used in bulletproof vests, resists impact very well. The arrangement of fiber in the composite material is such that it can withstand great amounts of pressure without cracking. The design using Kevlar at 0.040 inches in thickness was successful in deflecting bird collisions without any damage. The new model of the Dash-8, using added composite materials, is 6.5% lighter when calculating the airframe. The new model proved to be more efficient and able to withstand impact from a four-pound bird.

Due to many encounters with bird strikes to the leading edge of aircraft, the United States Air Force (USAF) uses composite materials to reduce the weight of planes and to strengthen the leading edge. The military fly aircraft at high speeds and low altitudes where the majority of the bird-to-aircraft collisions occur. In order for the leading edge to withstand varied encounters with birds, the strength of the materials needs to enable the leading edge to remain stable and to keep the aircraft in the air on impact. The USAF Fairchild A-10 Thunderbolt II aircraft has undergone extensive tests to improve the durability of the leading edge (Nolet, 1986). The newest design used in this aircraft consists of a graphite/Kevlar laminate. The Kevlar material proved to have enough bending stiffness and transverse shear strength to resist the impact of a major bird collision (Nolet, 1986).

Collisions between birds and aircraft are a significant concern. Bird strikes create significant monetary loss and needless loss of lives. To seek solutions to this problem, research has been conducted to seek stronger, lighter, and cost-effective materials. Composite materials have been found to be the most effective in withstanding great amounts of pressure. Kevlar is a composite material that has been used with success. An arrangement of fibers in Kevlar allows the plane to withstand the impact of a major bird collision. The use of composite materials becomes critical to minimize the damage and eliminate fatalities due to aircraft collisions with birds. Bird strikes will always occur; therefore further research is warranted.

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Advisors' Perspectives on Why Wichita State University Students "Stick it Out" and Graduate from College

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Research has been conducted for over 20 years in an attempt to decrease drop out rates and increase retention on college campuses. Monetarily, college institutions experience loss in tuition, bookstore, cafeteria, and residential hall revenues and institutional financial aide. Likewise, community businesses that rely on student patrons and student employees to thrive are also greatly affected. Community pride and campus morale are also affected if students drop out of local institutions (Robbins, 2001).

One question remains to be fully answered: Why do some students persevere against the odds and finish their degrees? Little research has been done in the area of retention in regard to resiliency. Resiliency is the "ability to recover rapidly, as from misfortune" (Webster, 1984). Thus, this pilot study attempted to better understand the reason(s) why Wichita State University students are resilient.

Advisors on the college campus counsel students on a wide array of issues ranging from personal to academic concerns. Advisors' views on student resiliency are pertinent; therefore, advisors were selected as participants for this research. Participants in this study were 35 individuals employed at WSU (9 men and 26 women) whose main responsibility includes/has included academic advising. Thirty-three (~29.5%) of the 112 people who received the questionnaire completed and returned it. One was returned without the consent form; therefore, only 32 could be counted in this study. Seven out of the original population were identified as self-help/motivational course instructors in the College of Liberal Arts and Sciences who taught one or more of the following courses: LASI 100A (Returning Adults); LASI 102 (Career Exploration); and LASI 150D (Major/Career Path). All seven interviewees were interviewed in person.

Participants' perspectives of why they feel WSU students are resilient were measured using the Resiliency of Wichita State University Students Questionnaire (Vu, 2001). The survey consisted of 12 self-report questions. The two most important questions asked participants to name as many reasons why they felt WSU students were resilient or why they thought these students dropped out. Responses were plotted on a frequency chart so patterns could be easily identified. Instructors' perspectives on what made their past and present students resilient were gathered through one-to-one interviews. Instructors were given one open-ended question asking them to name reasons why they feel their students are resilient. Their answers were compared with the reasons received via questionnaire responses.

The top five reasons respondents named as factors for resiliency of WSU students are as follows: (a) students are focused because they understand the connection between their educational plan and future goals in terms of employment (17/32); (b) students use personality traits in a positive manner to succeed (14/32); (c) students have a good support system (13/32); and (d) college is both a priority for them as well as the primary means for job security in the future (11/32). According to six instructors, the main reason they believed their students were resilient was the fact that the students were—for one reason or another—excited to be in college and eager to learn. Four instructors also named possessing determination, having a focus, and holding a college degree as a personal goal as factors contributing to resiliency.

While student retention has most often been looked at from a negative standpoint in the past by focusing on why students drop out, this pilot study attempted to understand why students "stick it out." Focusing future research efforts on resiliency may be a key to finding ways of developing policies or programs to encourage or enhance those factors that lead to resiliency among our students. Although past studies identify high school and entrance exam scores as reliable predictors of success for new college students (Tinto, 1975), these factors were not as prevalent in this study. According to the 32 individuals surveyed, the top reason why students at Wichita State University are resilient is that they are focused and realize that college "is a must for success." Six interviewees felt that resiliency comes from students' enthusiasm for being in college. It is plausible, when comparing the results from respondents and interviewees, that instructors' perceptions of enthusiasm and eagerness in their students could be connected to students' understanding of how college interrelates to their future personal career goals. In the same token, students' determination and other personality traits may be working together to ensure that they finish their degrees.

The results of this pilot study will be compared with future research. Plans are under way to send a more efficient questionnaire to Wichita State University advisors in the fall 2001 semester. Results from fall responses will then be used to develop a questionnaire for returning adults who are or have been enrolled in the Returning Adults course to see if the factors for resiliency perceived by advisors and instructors are consistent.

Although the results of this study are limited, that enthusiasm and focus were listed as critical components of resiliency is important to note. Perhaps greater effort in explaining why certain aspects of a college degree are necessary for students' college should be implemented. The general education program tends to be an aspect of all students' college experience that many have a hard time understanding. Are there better ways of conveying the relevance of these requirements to students? What else about the 'big picture' do students not get? There are so many questions that are still not answered.

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