

Letters of Support



THE FOUNDATION FOR HUMAN POTENTIAL



The University of Chicago
DEPARTMENT OF PSYCHOLOGY

COMMITTEE ON HUMAN DEVELOPMENT
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Prof. Mihaly Csikszentmihalyi

February 11, 1997

Re: The Foundation for Human Potential

I have been aware for several years now of the activities that Andrea Gellin Shindler and the Foundation she directs have been sponsoring. The symposia on *Art and the Brain*, *Music and the Brain* and *Sports, Dance and the Brain* were path-breaking events, where interdisciplinary scholarly discourse at the highest level took place in front of an attentive general public. These and similar events have confirmed that the Foundation for Human Potential has become a highly visible and effective venue for communicating the often obscure findings of human neurophysiology and neuropsychology to a lay audience, and to explore their implications for education.

The next project on Andrea Shindler's agenda is a symposium on "emotional intelligence". Needless to say, this topic is very popular at the moment, yet there has been little critical discussion of the issues involved. For this reason, such a symposium should be very useful and timely. It would be an excellent sequel to the past event organized by the Foundation, and it would definitely establish its mediating role in the intellectual life of Chicago, and indeed the nation.

Sincerely,

Mihaly Csikszentmihalyi
Professor of Human Development

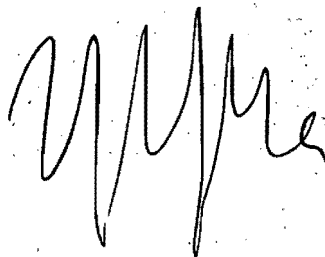
Statement by Yo-Yo Ma for the Foundation for Human Potential:

I have always been fascinated by the connection between the creative process and related neurological patterns which occur in human beings. Ultimately, underlying this fascination with the workings of the individual artist is a desire to understand why every society has had a need to produce art in one form or another, and how the production of that art form effects the human thought process.

As we make advances in neurological research and gain substantial scientific data on the relationship between the brain's relationship to artistic output, we will perhaps be one step closer to understanding some basic elements common to all mankind.

The Foundation for Human Potential supports studies of human creativity and the brain, and hosts symposia which allow further exploration of related topics. This year's symposium, entitled **Sports, Dance, Movement, and the Brain**, will provide the rare opportunity for scientists, artists, and educators to come together to explore common elements like time, space, motion, structure, and variety-- elements which are found in every discipline. The seeds of information exchanged at this kind of symposium will undoubtedly take root in new studies of the human brain and the arts, and reveal new approaches and perspectives on how human beings learn, function, and relate to one another.

I wish the Foundation for Human Potential every success in this worthwhile endeavor.

A handwritten signature in black ink, consisting of stylized, overlapping loops and lines, representing the name Yo-Yo Ma.

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March 28, 1994

To Whom it May Concern:

I am pleased to endorse the request for funding for the ongoing activities of the Foundation for Human Potential, including "Sports, Dance, Movement and the Brain: A Symposium" planned for April 1995. I attended "Art and the Brain: A Symposium and Art Exhibit" in 1988 and consider it to be among the most important and memorable meetings that I have attended. Andi Shindler, the Executive Director and Founder of the Foundation for Human Potential, brought together an incomparable group of researchers from many disciplines, the educated public, and a remarkable set of artists who have continued to produce despite various kinds of impairments. Both the tone of the proceedings and the discussions and interchanges that took place following the papers were exemplary. It is no exaggeration to say that those in attendance have been marked by a bond; I know that I have had many opportunities to remain in contact, and to build upon, the relations forged at the meeting, with artists as well as with researchers. My discussions with colleagues and participants in "Music and the Brain: A Symposium" in November 1992 confirm that the latter Symposium had a similar impact on its attendees. Additionally, many of those who attended "Art and the Brain" returned for "Music and the Brain", expressing great interest in future symposia exploring the relationship between brain function and other abilities.

In undertaking a symposium on movement and the brain, Ms. Shindler takes on an important new challenge. While there have been a number of symposia on art and music held in the brain and behavioral sciences, there have to my knowledge been few if any comparable undertakings in the area of dance, sports, and other domains involving the skilled use of the body. Ms. Shindler has been in contact with many of the most important researchers in this area, as well as appropriate figures from the worlds of dance and athletics. This symposium promises to be a particularly important and fascinating one, which should prove of great moment for the fields involved.

Ms. Shindler has indicated that, in addition to the continuation of the series of symposia for a diverse audience and follow-up workshops for professionals, exploring the relationship between brain function, learning, and creativity, she is now in discussions with schools and school districts regarding the potential restructuring of curriculum, emphasizing the

importance of the appreciation of individual differences in learning styles. As the mission of the Foundation for Human Potential is to foster interdisciplinary research into brain-behavior relationships and to derive teaching methods from that research, the dual thrust of the Foundation for Human Potential fills a need to address these issues in a research context, as well as an educational one. I applaud and support these endeavors, because it is the important end result to be attained, the possible benefit to educators, children, and adults which distinguishes this enterprise from others.

Why is this work important? First, it is important to focus on and to try to understand the more positive aspects of human nature, of which artistic expression and bodily-kinesthetic expression, including dance, sports, and the movement of mime and acting, are outstanding instances.

Secondly, understanding of the brain is accumulating rapidly. However, most of those involved in brain study tend to be reductionistic and do not pay adequate attention to higher functions. To my way of thinking, any comprehensive theory of brain function needs to take into account human artistic capacity, including sports, dance and movement. These symposia can help to bring about a broadening of worldview among neuroscientists.

Third, damage to the brain continues to be one of the principal human afflictions. It is crucial to understand the effects of brain damage on artistic, musical, and kinesthetic capacities and, especially, to understand the important roles that the arts can assume in the treatment and rehabilitation of brain injury. Artistic and other forms of expression may assume an even more critical communicative role when other avenues are blocked or impaired.

Fourth, as an educator, I know that the arts are a crucial, indispensable part of human cognition and experience. During these times of budget cuts, the arts are almost always sacrificed, doing huge harm to existing programs and to the children who should benefit from them. As our understanding of the cognitive, affective, and social nature of the arts increases, we should be better able to justify their inclusion in the education of all civilized human beings and to bring that education about in the most informed way.

Ms. Shindler proposes to continue to study the brain-behavior relationships of learning and creativity through the means of these important symposia and to attempt to derive practical methods to teach, and to reach, children and adults, both neurologically impaired and normal, through educational means. Her goals are laudatory, her means, exemplary. Support of her efforts, in both the project and the ongoing work, could benefit children and adults in all cultures.

For all of these reasons, I hope that it will prove possible to secure the support the Foundation for Human Potential needs to continue this fine work.

I would be happy to supply additional information as requested.

Sincerely,


Howard Gardner
Professor of Education
Co-Director, Harvard Project Zero
Adjunct Professor of Neurology, Boston University School of Medicine

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THE UNIVERSITY OF IOWA



DATE: November 8, 1995

RE: The Foundation for Human Potential

The Foundation for Human Potential has undertaken an ambitious program of dissemination of integrated knowledge in the fields of the sciences and the humanities. The Foundation's director, Andrea Gellin Shindler is to be credited with organizing several symposia in which experts from neurology, psychology, education, music, dance and the arts, and sports, came together in an effort to interrelate and make their activities more clearly understood to the lay public.

Without a doubt, the Foundation's efforts have touched many individuals in the Chicago area and elsewhere. I personally look forward to see it continue its activities especially if they will be focused on a badly needed educational effort in schools.

The Foundation for Human Potential deserves our attention, appreciation, and support.

Sincerely,

Antonio R. Damasio

Antonio R. Damasio, MD, PhD
M.W. Van Allen Professor and Head
Department of Neurology

ARD/nap



The University of Chicago

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December 8, 1994

Andrea Shindler

The Foundation for Human Potential

3240 N. Lakeshore Drive, #9B

Chicago, IL 60657

Dear Andi:

I am deeply honored to serve as a member of the Board of Trustees of *The Foundation for Human Potential*. Although C.P. Snow saw two cultures and no way to weave their threads into a single tapestry, your vision and your accomplishments in bringing together the world of science with that of the larger culture are doing just that. In my view, it is not only the realization of human potential that depends on the continuation of this process, but our survival as a species.

The conditions of natural life for other animals reflect their common understandings, by instinct or by learning, and the behaviors these govern. But the human world has become one in which the conditions of our daily lives are powerfully determined by mysteries of science that nearly none of us understands and in which scientific consciousness attends mainly to itself. The danger of public ignorance and scientific arrogance is especially critical in this era as human brains are beginning to decipher their own workings. In my own field of human neuropsychology, I have witnessed the selling of pseudoscience in popular books, weekend courses, the popular media, and in the school systems.

The conferences on **Art and the Brain** and **Music and the Brain** are the only ones that I have ever attended in which artists and scientists, teachers and students, physicians and patients, and the general public seriously listened to each other, taught each other, and learned from each other. This kind of interchange, in which different scientists challenge each other before a listening and learning audience and in which other scholars, educators, artists, and the public contribute their perspectives, is a brilliant beginning. Much more is needed. I believe that *The Foundation for Human Potential* has a major role to play in weaving together Snow's two cultures. You and the *Foundation* have moved us forward toward this unification.

Warm regards,

Jerre Levy, Ph.D.
Professor

Media Articles · MUSIC & THE BRAIN



THE FOUNDATION FOR HUMAN POTENTIAL

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Special Report

Music and the Mind: Scientific Musings

by Gail McBride

Can the eye of science *feel* the true character of music, and its unique power to animate the person?

—Oliver Sacks, *Awakenings*

As neurologist and author Oliver Sacks observed, listening, playing, singing, or just moving to music often has dramatic effects on patients with profound neurological impairments, such as stroke or Parkinson's disease. Like Sacks, many neurologists, psychologists, musicologists, and others for years have been fascinated by music's role in human behavior and its effects on the functioning of the brain and nervous system. Equally compelling are the brain processes that are involved in producing and responding to music.

The scope of this interest has ranged from ponderings on the creative impulse to intensive scientific study, such as using the highly sophisticated imaging technique of positron emission tomography (PET) to record the metabolic activity of the brain while it is engaged in a musical task. Yet despite many intriguing observations and clear evidence that music therapy can be effective in rehabilitating some neurologically impaired patients, because of the brain's awesome complexity, very little is known with certainty. In fact, some things that were once accepted—for example, that the "music center" of the brain is located in the right hemisphere—no longer are. As one leading scientist in the field put it, investigators are only beginning to "tame" the "wilderness of [their] ignorance."

Recent developments in the neurosciences have led to wide-ranging neuroanatomic research and exploration of the brain's organization and mental processing as they relate to music. As a testament to this work, in November 1992 a symposium, "Music and the Brain," was held in Chicago. The conference was organized and directed by Andrea Gellin Shindler, founder and executive director of the newly established Foundation for Human Potential of Chicago, with assistance from the Chicago Symphony Orchestra and the School of the Art Institute of Chicago and funding from, among others, the National Institute of Mental Health and the National Institute on Aging. The symposium brought together neurologists, psychiatrists and psychologists, musicians, music therapists, educators, cultural anthropologists, and others for three days of lectures and discussions. The spectrum of topics covered was as diverse as the backgrounds of the participants.

Among the many questions posed at the conference were: What is the basis of musical creativity? Why does music pervade all cultures? Can brain areas involved in musical ability be localized? How can the genius of a Mozart be explained? What makes the musical savant so exceptional? Why do people vary in their perceptions of music? What is the role of the auditory system in music? How are music and language related? And what has been learned from studying well-known musicians with known or suspected neurological deficits? The following provides a glimpse of some of the recent insights into this broad and fascinating field of study.

The nature of creativity

One of the topics addressed at the Chicago conference was whether musical creativity is unique and independent of other mental processes or whether creativity in music and in other disciplines is the product of common mental processes. In the book *Frames of Mind: The Theory of Multiple Intelligences* (1983), the Harvard University psychologist Howard Gardner made a case for the former view, proposing that there are multiple and distinct types of intelligence, such as visual, verbal, and musical.

Among those who have explored the latter possibility is Robert S. Root-Bernstein, professor of physiology at Michigan State University. Specifically, he has looked at scientists (including mathematicians) who have been musicians (or other kinds of artists) as well, often of high caliber. Indeed, many scientists (past and present) have been or are virtuoso performers, and some have even designed and made musical instruments as well as composed. Albert Schweitzer, Aleksandr Borodin, and the contemporary scientists Solomon Snyder and Stephen Jay Gould are just a few examples of scientist-musicians.

Although music and science are seemingly disparate fields, Root-Bernstein has concluded that common mental processes underlie the creative activities in each. In his words, the "coincidence of abilities" is not "by chance." By studying the mental processes involved in the scientific and musical endeavors of these "doubly gifted individuals," Root-Bernstein has found that they rely on precise "tools of thinking"—analogizing, pattern forming, abstracting, and kinesthetic thinking, among others. The main talent of

creative people, he believes, is the ability to transfer between modes of thinking and to make connections between insights and ideas—be they of a scientific, musical, or other nature.

Music and neuroanatomy

Because of the many associations that have been observed between music and specific anatomic structures in the brain, the belief persists that certain brain areas must be more involved with music than others. Many scientists have attempted to identify such potential brain centers by studying people with brain dysfunction or damage.

In a type of epilepsy called musicogenic epilepsy, susceptible people may have seizures upon hearing specific passages or types of music—for example, a portion of the second movement of Beethoven's Fifth Symphony or salsa music. The abnormal electrical activity associated with this type of seizure (seen on an electroencephalogram, or EEG) is usually in the right or left temporal lobe of the brain, the portion generally associated with acoustic (auditory) sensations.

In contrast, patients who have what are called musical partial seizures spontaneously "hear" (i.e., hallucinate) sounds in their minds. Those sounds can be music, speech, or noises (such as whirrs, clicks, or single tones). Such hallucinations produce EEG activity that is also focused in the temporal lobe but more often in the brain's left hemisphere.

The Montreal surgeon Wilder Penfield triggered hallucinatory seizures in 20 patients during neurosurgery by stimulating certain areas of the cortex (the brain's outer layer). One patient could "hear" a male chorus and orchestra performing "White Christmas"; another "heard" a jingle from a radio commercial. Other patients heard words rather than music, but Penfield found there was no apparent separation between brain areas that precipitate hallucinated words or music. Other scientists have found that some elderly persons who are becoming deaf may have so-called release hallucinations; i.e., they "hear" music, often from their distant past. The mechanism is unclear but does not appear to be epileptic.

Another way to relate music to certain brain areas has been to study persons whose brains have been injured or impaired through illness or who have undergone brain surgery. Sometimes these people lose certain musical abilities that they had previously (known as amusia). The location of the injury or disorder offers clues to the specific brain area that was the presumed source of that lost musical ability.

Some people with damage to the brain have aphasia—a language disturbance that often involves the inability to speak or write—but no amusia. That is, they can no longer speak, but they can "sing" words and/or compose music. Commonly these people have damage to the left hemisphere, which, in most right-

handed people, is the brain's language center. One example is a composer who suffered a severe aphasia—could neither comprehend what was said to him nor read nor write—but he was still able to compose quite well and, despite his aphasia, wrote songs, quartets, choruses, and a symphony.

Another group of patients that have been studied—the largest group—have both aphasia and amusia. A well-known composer, Maurice Ravel (discussed below), is an example. A third group have amusia without aphasia, a condition that is probably not widely diagnosed because language skills remain intact and victims do not seek treatment. These patients may have normal language function and may be able to recognize a melody, but they cannot sing or whistle. Most have been found to have lesions in the brain's right hemisphere; thus, investigators believe that the right side of the brain may affect musical pitch more than rhythm. On the other hand, some patients with lesions in the left hemisphere have problems reading or writing music.

Individual patients, however, present almost endless variations within each of these three groups. Thus, at least for the present, firm conclusions about specific locations of unique musical skills cannot be drawn.

Music and language

The defects of aphasia and amusia highlight the relationship between music and language. One investigator of this relationship is John C.M. Brust, professor of neurology at Columbia University College of Physicians and Surgeons, New York City. Brust points out that there are well-recognized musical aspects of everyday speech—rhythm, pitch, and inflection, known collectively as prosody—and that prosody can be intrinsic (the sound of speech—e.g., whether it sounds German or French), emotional, or propositional (conveying meaning).

A type of music therapy based on prosody has helped some patients who have aphasia without amusia. Over two centuries ago it was observed that a young man rendered speechless after a major blow to the head was still able to sing in a church choir. This intriguing preserved ability, in spite of a severe aphasia, prompted therapists to investigate the potential of music therapy for aphasia.

About 20 years ago Nancy Helm-Estabrooks, a speech pathologist at Boston University School of Medicine, and colleagues Robert Sparks and Martin Albert developed the technique called melodic intonation therapy. As Helm-Estabrooks described the therapy at the Chicago symposium, a patient first is instructed to sing short phrases and sentences as simple sing-song melodies containing only high and low tones—the pitch pattern resembling as closely as possible how the phrase or sentence would be spoken. Next, the phrase or sentence is sung with an

exaggerated stress pattern in more of a monotone, much like choral speaking. Gradually the melodic content is faded, and the patient "speaks" rather than sings the phrase or sentence; finally, he or she responds to questions by using normal speech.

Melodic intonation therapy is used to draw out language function, presumably from the right hemisphere. It is particularly useful for restoring acceptable speech in patients with left hemisphere strokes that impair articulatory agility but spare auditory comprehension.

Perception of music

In addition to studying patients with brain dysfunction, such as epilepsy or brain injuries, there are newer ways of investigating the relationship between music and the brain. One such technique is called dichotic listening. In these investigations earphones are used to feed different messages, tones, or music into a person's two ears simultaneously. If the left hemisphere is dominant, the person will primarily describe what was fed into the right ear, and vice versa. The technique is controversial, however, because it is not difficult for the tester to unwittingly increase one ear's advantage over the other—for example, by decreasing the duration of noise fed into one ear or manipulating the acoustic features of the sounds. Furthermore, what may appear to be differences and asymmetries between the two cerebral hemispheres can reflect internal auditory pathway delays or other kinds of information loss that affect what is heard. Hence, results of such studies have varied greatly depending on how the technique is set up; the subject's age, aptitude, and training; and whether recognition of melody, pure tones, timbre, pitch, or rhythm is used as the criterion. Differences also occur depending on whether only a basic tone or the basic tone plus its overtones (tones whose frequencies are multiples of the frequency of the basic tone) is played.

Nonetheless, some useful information has emerged from dichotic listening studies. For instance, as neuropsychologist John J. Sidtis at the University of Minnesota has found, complex pitch perception (timbre, involving overtones) appears to be a right-hemisphere ability, whereas basic speech perception is focused in the brain's left hemisphere. Others have suggested that the right hemisphere is especially concerned with emotional aspects of music, whereas the left hemisphere is more concerned with analytic aspects. Reflecting on the evidence for cerebral localization of musical processing at the symposium, Brust quipped, "I probably listen to Tchaikovsky with my right hemisphere, Haydn with my left, and rock with my brain stem."

Diana Deutsch, professor of psychology at the University of California at San Diego, has been a pioneer of music-perception studies and is the discoverer of what is now dubbed the "Deutsch illusion."

Her discovery came about when she used a dichotic listening situation in which subjects were presented simultaneously with single alternating notes an octave apart—the lower note first in the left ear and the higher note first in the right ear. Subjects, however, reported always hearing the high note only in the right ear, alternating with a low note only in the left ear—the Deutsch illusion. Later, however, another investigator showed that although most nonmusicians report the illusion, most musicians do not, suggesting perhaps that musical experience can change the brains of musicians.

Deutsch and her colleagues have extended their analyses to more complex situations. They have found, for example, that the perception of certain patterns of tones—whether melodies are perceived as ascending or descending—not only varies among subjects but also is distinctly affected by shifts in key, a phenomenon that no one had expected and that remains unexplained.

In the past few years, many neuroscientists, using the newer imaging techniques of PET and magnetic resonance imaging (MRI), have begun taking a new look at the brains of people involved in musical tasks and are questioning some of the older views. These studies, proceeding from the premise that music is a unique human attribute—a type of communication system distinct from but possibly on a par with verbal skills—may shed important new light on cerebral topography and a great deal else.

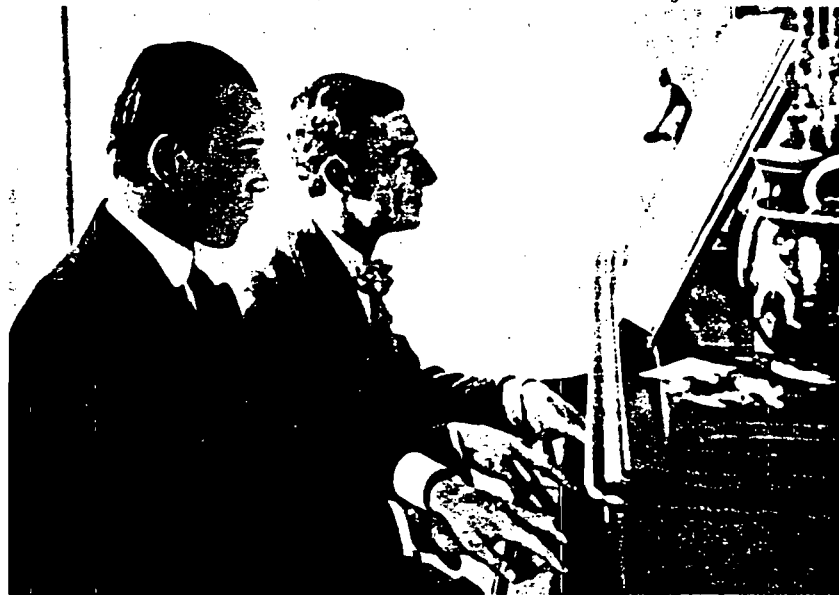
Ravel's musical brain

The inspiration for a very intriguing recent study conducted by neuroscientists at McGill University, Montreal, was the French composer Maurice Ravel. Ravel developed a degenerative brain disease in 1929, and his final years of life were clouded by a mild type of aphasia and to some extent by amusia; he died in 1937 at age 62. His aphasia led to difficulty in finding the correct words to express himself (although he could usually make himself understood, and he was still able to comprehend language satisfactorily). Soon after the disease's onset, he became unable to read or write words but, for a time, he was able to commit his compositions to paper, although words on his scores (to indicate dynamics and tempo) were poorly written and often misspelled.

Part of the tragedy of Ravel's illness was that although he could still listen to and enjoy music, play scales on the piano as before, and perceive pitch, rhythm, tempo, and pace, as well as detect any errors made when his own compositions were played, he could not read a score and then play or sing it himself. In the end, though he could still compose melodies and harmonies in his mind, he could not write them down or play them.

At the Chicago symposium Justine Sergent, director

The French composer Maurice Ravel—in his prime in 1912—plays his score for the ballet Daphnis and Chloe with Russian dancer Nijinsky (seated on his right). Later Ravel developed a degenerative brain disease that left him unable to play the piano, read a musical score, or write down music and also affected his ability to express himself with words. Although much about the composer's illness remains a mystery, it raises intriguing questions about the functional organization of musical functions in the brain—particularly whether musical and verbal abilities derive from the same cerebral structures.



of the cognitive neuroscience laboratory at the Montreal Neurological Institute and associate professor of neurology and neurosurgery at McGill, reported on the results of brain-imaging studies of 10 highly skilled right-handed pianists made while they were sight-reading and listening to themselves play an unfamiliar piece of music with the right hand on a keyboard.

It was the musical abilities that Ravel lost that Sergent and her colleagues were attempting to assess. They wanted to know what brain areas are involved in the translation of musical notation or ideas into patterns of sounds. They knew musicians rely primarily on spatial information—the notes' position relative to one another on a staff—in order to read and play.

While the 10 subjects were performing their task, PET scans were made of their cerebral blood flow (an indication of brain activity) over the span of one minute. PET scans of brain areas activated during performance of more familiar, "control" tasks (such as playing scales) were also made. Using a sophisticated computer processing method, the researchers were able to "subtract" the latter images from the former and then superimpose the "remaining" PET scans over an MRI scan of each musician's brain. This enabled them to see what brain structures were specifically activated during the experimental task.

What they found was that the sight-reading/playing/listening task recruited a neural network involving all four of the brain's main lobes (frontal, parietal, occipital, and temporal) in both hemispheres as well as the cerebellum, which is concerned with movement. Sight-reading and listening, without playing, specifically activated certain brain areas, such as the inferior parietal lobules of both hemispheres, leading the researchers to believe that these areas play a key role in the ability to connect notes on a musical score

with their corresponding sounds—a facility that Ravel lost. These areas are next to but separate from those involved in the linking of visual and auditory representations of words.

The results also indicated an important role in the three-part task for the superior parietal lobule, which normally is not activated when subjects play notes they are reading. The researchers believe this portion of the brain may underlie translation of what the eyes see (e.g., a score) to what the fingers play. In other words, that brain region accommodates the processing of spatial information from the score into the brain's motor cortex and then into a motor "program" that directs the patterning, timing, and positioning of fingers on the keyboard.

Sergent and colleagues were surprised by their results, although Sergent herself has always maintained that the brain works as a whole. There is much more, of course, to learn about the complex neuroanatomic aspects of music making. As Sergent wrote in *Science* in 1992, the acts of "sight-reading and playing are only a fraction of musical experience, and we are still far from understanding the pleasure and emotions elicited by music, as well as the composer's mind."

Emotion in music

In fact, other studies done in Sergent's laboratory bear on the emotional side of music and indicate that possibly a component of the brain's limbic system may be activated when a musician listens to music or plays from memory. Other research suggests strongly that the limbic system—comprising a number of structures located deep in the brain, including the amygdala and hippocampus—is active in emotion. In the last several years, it has become evident that emotions are generated by the amygdala, whereas the hippocampus is

crucial for forming memories of life events and storing them in the brain. Neurologist Elliott Ross at the University of North Dakota School of Medicine, Fargo, believes, on the basis of recent studies, that the right hemisphere's limbic system is the source of primary emotional content in the performance of music.

Among other relevant studies of the brain using PET scans were those done some years ago by researchers John C. Mazziotta and colleagues at the University of California at Los Angeles, involving both musicians and nonmusicians listening to music. In this case glucose metabolism (another indicator of brain activity) rather than cerebral blood flow was measured. On hearing music, the musically unsophisticated subjects—who said they tended to just enjoy listening to music or to “sing along” with it—showed more activity in the right side of their brains, whereas the musicians—some of whom said they visualized the notes they heard on a score or in other ways—showed greater activity in the left hemisphere. According to Ross, this seems reasonable because the written notes, chords, and scales that musicians work with are a form of “language” that symbolically represents music, and symbolic aspects of language processing are ordinarily handled best by the left hemisphere, whereas the nonverbal affective aspects of language are handled by the right hemisphere.

How do musicians play?

How the neuromuscular system controls musical performance and the development of musical skill is another fascinating focus of study. A number of researchers are now studying the role of the basal ganglia deep in the brain with respect to the playing of music and that of the cerebellum in the timing of skilled movements. “The experience of learning music involves, for the nervous system, transforming this eager enthusiastic chorus of somewhat clumsy activity into something more coordinated,” neurologist Frank R. Wilson of the University of California at San Francisco told the symposium audience. “But what actually happens in the brain? We don’t yet know.”

In one study, Wilson statistically analyzed four dif-

ferent performances by a pianist who was connected to a computer that measured motor activity while he was playing the fourth movement of Chopin's *Sonata in B Minor*, a piece with numerous right-hand descending runs. The performances were almost identical. Moreover, there was great similarity between the performances of this pianist and those of another playing the same piece. Wilson theorizes that for the musician practice converts playing into an automatic and unconscious activity.

Music: a language for savants

So-called musical savants are people who generally are mentally retarded but show unusual musical skill. These individuals are most often male; they often have congenital blindness or very poor vision; and most have language delay and difficulty in verbal communication.

A complement to the lectures at the Chicago symposium was a special performance by Tony DeBlois, who at age 18 is blind, mentally retarded, and possibly autistic and is an accomplished pianist. In 1991 DeBlois received the Itzhak Perlman Award from Very Special Arts of the John F. Kennedy Center for the Performing Arts in Washington, D.C. At the conference he played both classical music and jazz (his favorite).

Tony was a premature child with a host of physical problems. Oxygen therapy at birth for treatment of neonatal jaundice led to destruction of his retinas and thus blindness. When he was three years old, his mother noticed that he responded particularly to sounds in his environment. By the time he was of preschool age, he clearly had language difficulties and attention and motor-coordination problems, but these were accompanied by obvious musical abilities. His mother encouraged his musical abilities from an early age, and his involvement in music, despite his severe retardation, seems to have fostered some development of his verbal and social skills. Currently Tony is a special student at Boston's Berklee School of Music.

Leon Miller, associate professor of psychology at the University of Illinois at Chicago, has studied musical savants and is the author of the book *Musical Sa-*



From Justine Sergent, M.D., et al., “Distributed Neural Network Underlying Musical Sight Reading and Keyboard Performance,” *Science Magazine*, vol. 257, July 3, 1992, pp. 106–109. Copyright 1992 by the AAAS

“Averaged” brain images of 10 professional pianists sight-reading and playing a Bach partita show the localized activation of cerebral structures for component operations of the sight-reading task. Lower bright areas reflect the brain’s involvement during reading of the score and translation of the notes into finger patterns; uppermost bright areas indicate activation of the frontal cortex, responsible for the organization of the motor movements of playing.

Practicing with a member of his jazz ensemble group, Tony DeBlois plays up a storm at the piano. Tony is blind and mentally retarded but at a very young age demonstrated remarkable musical ability. He has since become an accomplished pianist, playing both classical music and jazz, and is now a student at a Boston music school. Professionals who have studied musical savants like Tony believe that music becomes a "language" that offers them a way of understanding and relating to the world.



vants: *Exceptional Skill and Mental Retardation* (1989). Miller has found that, as in DeBlois' case, the intense musical interest of savants appears very early in life. Among their many unusual traits, he has found, is their remarkable "ear" for new musical material; they can usually play a piece of music with uncommon mastery of melody, harmony, and tonal structure after a single hearing. They also tend to have perfect pitch.

Music may offer savants a method of communicating with the world—one that links them to their families and the rest of their environment. Miller points out that both music and language rely on the auditory system and thus have important similarities. But whereas in most children the language function becomes predominant as they grow up, this does not happen with savants.

Because many musical savants are blind, Miller speculates that normal visual input to the occipital lobe is lacking and, thus, cortical areas typically dedicated to processing this information have nothing to do; there may then be a rededication of these portions of the cortex to other functions. In support of this, Tedd Judd, a neuropsychologist at the Pacific Medical Center in Seattle, Wash., says that in many cases savants have suffered oxygen deprivation during birth, which would preferentially damage the cerebral areas that are actively developing at the time. Moreover, many savants have a pattern of language development that resembles the type of aphasia known as transcortical aphasia, in which the speech centers seem to be isolated from other cortex areas where most semantic connections are made. While this may inhibit the development of some abilities, such as abstract reasoning and linguistic processing, it may allow other functions, such as repetition skills (which many savants possess), acoustic sensitivity, and musical memory to develop quite fully.

Current theories of brain organization hold that specific brain areas are dedicated to certain functions but are connected with each other. Recent experiments with developing primates show that when damage occurs to a specific brain area that is closely connected to another, the neural network is altered in such a way that a "competing" brain area may enlarge, essentially to fill a gap. Thus, as Ross and other neurologists, such as the late Norman Geschwind of Harvard Medical School, have speculated, normally less-prominent intellectual functions could become more prominent—often to an extraordinary degree. This type of functional reorganization could occur in the developing brain of a child, giving rise to the extraordinary skills observed in savants.

Miller suggests that there is a special relationship between music and language early in human development. Before they can understand words, infants use a combined music-language system; they clearly derive emotional information from the "melodic line" of their parents' speech as well as from other sounds in their environment. Furthermore, Miller points out that, as in the case of the savant, "music can emerge as a special way of understanding and relating to the world."

Although broad differences exist between the two cerebral hemispheres, with much of the language function tending to be served by the left, there are many links between the two hemispheres—as seen, for example, in the melodic intonation therapy described above. Increasingly, scientists are finding that some plasticity in the brain may be quite common. Ross and Sergent are among those who believe that the neurology underlying musical and artistic creativity is a very complex one that involves the participation of the whole brain rather than just the right hemisphere, as had been so commonly assumed and accepted.

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Symposium to study brain, musical ability

By TOM VALEO
Daily Herald staff writer

When she was a young speech therapist, Andrea Gellin Shindler worked with a young woman from Buffalo Grove who had suffered a massive cerebral hemorrhage that damaged most of the left hemisphere of her brain.

During the course of therapy, this woman, Carol Frankel, whose ability to speak had been devastated, developed an artistic ability that astounded Shindler. How did the brain injury stimulate this flowering of talent, Shindler wondered. What is the connection between brain function and creativity?

To seek answers to these questions, Shindler organized a symposium in 1988 titled "Art and the Brain." At her invitation, neurologists, psychologists, artists and others gathered at the Art Institute of Chicago to deliver public lectures on the most recent discoveries about how the brain works.

The symposium aroused so much interest that Shindler has organized another, titled "Music and the Brain," which will be held Nov. 16-18 at the Rubloff Auditorium at the Art Institute.

Two dozen speakers from the United States and Canada will speak during the three-day symposium, all of them offering a perspective on how the brain functions while creating and experiencing music.

"When I saw the effect of the 'Art and the Brain' symposium, I created the Foundation for Human Potential because I wanted to organize other symposia that would attempt to correlate brain function with various abilities," said Shindler, who is executive director of the foundation and lives in Chicago. "This is just a great opportunity for people from several disciplines to come together and try to figure out how the brain plays a role in creativity."

Much knowledge about the brain comes from studying people who have suffered brain damage from strokes or head injuries. By determining what part of the brain is destroyed, and then observing the deficiencies that result, scientists have managed to piece together a rather detailed map of brain functions.

"We can learn from artists who have sustained brain damage by studying what abilities they have lost, and how they have reorganized



Andrea Shindler, executive director of the Foundation for Human Potential, has organized a seminar titled "Music and the Brain."

Daily Herald Photo/Mark Welsh

the abilities that remain," Shindler said.

In this tradition, the symposium will include, on Nov. 17, a performance by Tony Deblois, a blind and autistic 18-year-old man who is, despite these challenges, an extremely gifted musician. (He is enrolled at the prestigious Berklee College of Music in Boston, where he is earning A and B grades even though his ability to communicate with words is severely limited.)

Deblois will perform two pieces — a classical selection, and Duke Ellington's "Take the 'A' Train."

And prior to the performance, Dr. Leon Miller of the University of Illinois, who is the author of a book titled "Musical Savants," will discuss the Deblois case, which he considers a striking example of "the extent to which musical ability is independent of other cognitive abilities."

At the "Art and the Brain" symposium, one of the most provocative talks was given by Dr. Antonio R. Damasio, who pointed out that our thoughts and perceptions are the result of several simultaneous brain functions that somehow merge into a coherent, unified experience.

Damasio and his wife, Hanna

Damasio, are doing groundbreaking research at the University of Iowa, where they use magnetic resonance imaging and other techniques to provide dramatic pictures of the brain in action. Damasio will talk about some of their results at the "Music and the Brain" symposium on Nov. 18.

This idea that the brain performs several parallel functions at once is a "hot topic" in brain research, according to Dr. John Brust of Columbia University in New York, who will provide an overview of research at the beginning of the symposium on Monday. "I think the magic word regarding brain functions is 'network.' We have this vast assembly of nerve cells that operate over space and time simultaneously. This type of parallel processing is a fundamental difference between the brain and computers."

Shindler organized her first symposium to learn how the brain produces art, and she believes the "Music and the Brain" symposium will also yield valuable insights. But she no longer believes that creativity and artistic achievement can be explained by a study of brain function alone.

"I used to think that everything an

artist did could be tracked in the brain, but that's not true," she said. "You must consider lots of other things — motivation, what activities the society considers important, what kind of support is available to the artist. One of the foundation's consultants, (the classical cellist) Yo-Yo Ma, said that musical talent goes far beyond ability. It depends on motivation, family involvement, determination, stamina — lots of other things. So you can't trace artistic ability entirely back to the brain, but you can't separate it from the brain either."

Registration for the "Music and the Brain" symposium begins at 7:45 a.m. Monday outside of the Rubloff Auditorium of the Art Institute (Columbus Drive entrance). Shindler's welcoming address is at 9 a.m., followed by six lectures lasting until 4:20 p.m., with a lunch break and two coffee breaks.

Lectures on Tuesday and Wednesday run from 9 a.m. to 4 p.m. The cost of the symposium is \$195, or \$95 for medical residents, students and senior citizens.

For information and a brochure, call the Foundation for Human Potential at (312) 528-2488.

HEALTH|SCIENCE

THE BOSTON GLOBE • MONDAY, NOVEMBER 23, 1992

In music, whole brain gets involved

By Richard A. Knox
GLOBE STAFF

CHICAGO - Tony DeBlois is blind and autistic. At age 18, he has trouble with abstract notions like "up" and "down." He cannot even button his shirt or tie his shoes. As a young child he could barely relate to the world around him.

But put Tony at a piano - especially in front of an audience - and he'll launch into an extended exploration of a jazz classic like Ellington's "Take the A-Train" that his teacher, Boston jazz pianist Paul Barringer, says is "highly improvisational" and "displays an intuitive understanding of the jazz language."

The operative word here is "language."

"Music is Tony's language," says his mother, Janice DeBlois of Waltham. "It's the mode we have used to bring out the verbal language. The more music we have pumped into him, the more language we have gotten out of him."

Tony DeBlois appropriately served as the centerpiece of a symposium on "music and the brain" last week at the Chicago Art Institute sponsored by the newly formed Foundation for Human Potential. He embodies an idea taking shape among scientists, physicians, musicians, music therapists and teachers - that music is a quintessentially human language with powers and purposes that researchers are only beginning to plumb.



SCANS COURTESY/DR.
JOHN C. MAZZIOTTA, UCLA

Brain scans show that nonmusicians listening to music (top) mainly process data with right hemisphere; musicians who can read and analyze music (bottom) use left brain more to process this data. Red shows most active areas.

So preoccupied is Western culture with words that music has been relegated to the status of a frill, a pleasurable but nonutilitarian human activity. School boards clearly consider it expendable. "Many of us in the arts are alarmed that in the recent federal Education 2000 planning document, the word arts was not even mentioned," says Henry Fogel, executive director of the Chicago Symphony Orchestra.

The evidence is beginning to show, however, that music is an alternate mode of thinking deeply rooted in the human character, embodied in its own complex brain structures and with purposes that may have much to do with our cohesion as a social species.

By this line of thinking, to minimize music is to overlook whole realms of human potential, dismiss the abilities of children who have difficulty with verbal thinking strategies and miss the chance to foster human empathy and cooperation.

Tedd Judd, a Seattle neuropsychologist

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In music, whole brain is involved

MUSIC

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and amateur musician, maintains that Western notions of music in the past two centuries or so derive from social stratification and division of labor. Our notion of music, Judd says, has been distorted into an individualistic activity in which a composer is sending a message through performers to passive listeners.

"Why do we make music? I venture to say music did not emerge so a composer could communicate a message to an audience," Judd said. "It is to feel the feelings with someone else, to have the experience of empathy."

Music, Judd continues, "was not originally intended to say 'I felt joy once and it was like this,' but 'Let's party!' Not 'I felt grief once,' but 'We are grieving together.' Not 'I prayed once,' but 'Let us pray.'"

Music-making, in this view, evolved as a central participatory experience. Judd likens it to sex, but more social. "As countless adolescents have discovered, the solo sexual experience does not tell you everything you might want to know about the duet," he points out.

Anthropologic studies of music support Judd's argument. The "main thing" about traditional African music, reports Simha Arom, director of the National Scientific Research Center of Paris, is its role "in communicating between humans and divinities and among members of the community. There are no listeners. Everybody is a participant."

Music's tribal role has its contemporary counterpart, researchers speculate, in rituals such as weddings, funerals, patriotic occasions and dancing parties. Its emotional



PHOTO / MARINE CRAWFORD SAMUELSON

"Music is Tony's language," Janice DeBlols says of her son.

punch is exploited by TV commercials, MTV and movie scores.

Seen this way, the neuroanatomy and neuropsychology of music – the way the brain processes musical information – begin to make sense.

Neuroscientists are discovering that the human brain has structures for processing and generating the language of music that are quite separate from those that deal with the language of words. Recent investigations are also turning up surprises that are forcing scientists to alter their conceptions of where music lodges in the brain.

Previous thinking, supported by controversial studies, placed music processing in the brain's right hemisphere. Since language usually resides in the left brain, which specializes in sequential, analytical operations, the idea that music is handled by the right brain, which is intuitive, holistic and good at detecting the gestalt of the outside world.

To some degree this idea was supported by previous studies carried out by Dr. John C. Mazziotti and colleagues at the University of California at Los Angeles. Through brain scans that measure blood flow, an index of which parts of the brain are most active during a particular operation, the UCLA researchers found that right-brain structures tend to "light up" when musically naive subjects listen to music.

However, the UCLA studies suggested that musicians' brains work differently. Once people learn to read music and approach it analytically, the left brain becomes more active in processing musical tones, the brain scans showed.

However, new studies by Justine Sergent of the Montreal Neurological Institute and Hospital show that the whole brain is involved in some if not most musical tasks.

Sergent studied the brains of 10 professional pianists as they read



ILLUSTRATION COURTESY / SUSUMU OHNO AND MIOHRO OHNO, CITY OF HOPE NATIONAL MEDICAL CENTER

Music derived from a portion of a mouse gene that codes for an enzyme involved in cell division.

Scientists probe music's power

Faced with mind-numbing mountains of data, scientists are beginning to exploit the musical skills of the human ear to sort it all out.

In short, they're extracting music out of an unlikely range of materials and phenomena, from the genetic code of a mouse cell to the atomic structure of air pollutants and from the way gas flows through a jet engine to the constituents of human urine. One researcher was able to tell where the obsidian in archeological artifacts was mined by listening to the auditory patterns derived from each sample's constituent elements.

"The human ear is a marvelous instrument," says David Lunney, a biochemist at East Carolina University in Greenville, N.C. "It can recognize speech sounds and not only derive meaning but get ideas about the sex, age, regional origin and level of education of the speaker. When you're doing exploratory data analysis and you don't know what's there, the ear may be superior to the state of the art in pattern recognition."

The best-known transformations of scientific data into music are the "compositions" of geneticist Susumu Ohno of City of Hope National Medical Center in Duarte, Calif.

Staring at endless strings of genetic code several

years ago, Ohno decided that the inherent patterns might be easier to appreciate if they could be turned into music. He performed the transformation by assigning two notes of the musical scale to each of the four nucleic acid building blocks (cytosine, adenine, guanine and thymine), called bases.

The resulting composition, based on a portion of a mouse gene called RNA polymerase and entitled "Mouse Waltz," reminded the California scientist of a Chopin nocturne (opus 55, no. 1).

Ohno's gene music, now expanded to an *oeuvre* of 17 pieces derived from such sources as a chicken's eye, a rainbow trout and a cancer gene, are aesthetically pleasing and philosophically intriguing, but they haven't replaced computer analysis of gene sequences.

However, a growing number of scientists and engineers are getting serious about the musical – or at least auditory – transformation of mute data. Researchers from AT&T, Xerox, Exxon, IBM, Apple Computers and other corporate labs were on hand several weeks ago at the First International Conference on Auditory Display in Santa Fe, N.M.

"It was a very eclectic meeting," Lunney said. "The field is in its infancy."

— RICHARD A. KNOX

and played the right-hand portion of an unfamiliar musical score, a Bach partita. Musical sight-reading, she noted in an interview, "is one of the most complex known. It's much more sophisticated than reading words because notes sort of all look alike, unlike letters. What's important is the relationships between the notes."

The Montreal researcher's brain scans showed "complete dissociations between the verbal and musical areas" of the brain, a novel finding. Second, both brain hemispheres are

involved in the task.

"It was a big surprise to us," Sergent said. "From the literature, it was always the right hemisphere. If anything, we found more activity on the left than right, but it's symmetrical on both sides."

Sight-reading a score involved a number of cooperating brain structures joined in a large neural network, Sergent found. The emerging picture begins to explain confusing case reports of musicians, like the French composer Maurice Ravel, who lost some but not all musical

abilities following strokes, head trauma or degenerative brain diseases.

Sergent said music's emotional power does not seem to stem from the right brain, either, as often assumed. Rather, music activates the amygdala, a structure tucked underneath the "thinking brain" or cerebral cortex that contains the areas responsible for musical perception, understanding, reading, writing and the technical aspects of performing.

Activation of the amygdala, part of the limbic system, fits nicely with

Continued on next page

Bach, brains and surprises

Continued from preceding page

notions of music's social functions. "In any social activity, the limbic system must be involved," Sergent said.

Interestingly, in recent brain studies of musicians playing familiar scores, the Montreal researchers found more activity in the limbic system, presumably because the musicians were investing the performance with more emotional content than when they were doing the merely technical task of sight-reading an unfamiliar score.

The discovery that music activates its own neural network distinct from verbal language has broad implications for the way the mind works and for strategies to enhance mental performance and creativity, according to researchers.

For instance, Jeanne Bamberger, a professor of music at the Massachusetts Institute of Technology, described how music unmasked the true abilities of a 9-year-old boy experiencing great difficulties learning to read, write and express himself verbally.

The boy, whom she called Brad, had been diagnosed as having a "severe auditory deficit" and "difficulty sequencing," but by letting him manipulate a series of bells and discover different ways of playing a simple tune, Bamberger showed that neither was true. Using musical con-

cepts, Brad spontaneously devised alternative strategies for answering questions that were inaccessible to him through the medium of words.

"Music showed his so-called deficits have to do with a language deficit," Bamberger said. "There must be a language mind behind the ear that is different from the music mind. It's very important to differentiate these and not talk about them as a lump."

But music may help humankind enhance the creativity inherent in all minds, not just those that appear impaired. The evidence lies in the stories of dozens of scientist-musicians, from Rene Laennec, the 18th-century inventor of the stethoscope, to Albert Einstein, who took refuge in Bach when stumped by a problem in theoretical physics, according to Dr. Robert S. Root-Bernstein of Michigan State University, a biochemist, science historian and cellist.

Unlike words, music is able to "explore and convey numerous concurrent themes," Root-Bernstein notes. "It requires practice thinking concurrently about complex patterns and sensing multiple levels of interaction - holistic thinking - rather than linear, reductionist analysis."

Music can teach us "ways to communicate between modes of thinking," he argues. And this may "break the bonds of accepted practice and allow new things to be done."

44. CHICAGO SUN-TIMES, THURSDAY, NOVEMBER 12, 1992

Scholars Put Minds To Studying How Music Is Created

CLASSICAL NOTES

By Wynne Delacoma

If you've ever wondered how composers and musicians get those sounds they hear in their heads out through their fingers and lungs and into the air the rest of us breathe, you might be interested in a three-day symposium titled "Music and the Brain."

The gathering of Pulitzer Prize winners, MacArthur Fellows and assorted other experts in both fields will meet Monday through Wednesday in the Art Institute of Chicago. The Chicago Symphony Orchestra and the School of the Art Institute are the presenters, along with the Foundation for Human Potential in Chicago.

Topics for scholarly discussion range from "Robert Schumann's Hands, Mind and Brain," a look at how the composer's developing mental illness affected his composition, to "The Measurement of Music and the Cerebral Clock: A New Theory." Meetings will be held from 9 a.m. to 4 p.m. each day.

The program is open to anyone. Registration is \$195. Lunches, a backstage tour of Orchestra Hall and admission to all Art Institute exhibits is included. Call (312) 443-3775.

ARE WHITE SALES NEXT? The CSO is serious about the retail business.

NEXT? The CSO is serious about the retail business.

CBS/Fox Tramps Out Some Chaplin Classics

VIDEO CONTROL

By Mary Houlihan-Skilton

Anyone familiar with silent films is also familiar with the life of Charlie Chaplin. In the coming months, legions of new fans will join these ranks when Richard Attenborough's bi-

At 6 tonight, Valerie Solti, wife of CSO music director laureate Georg, will cut the ribbon opening the Symphony Store, 224 S. Michigan.

The store is the CSO's first venture in selling symphony-related items in a free-standing facility just south of Orchestra Hall. A project of the CSO's Women's Association, it will be stocked with CSO CDs, clothing, posters, books and jewelry. Profits will benefit the CSO.

Store hours are 10 a.m. to 6 p.m. Monday through Saturday, noon to 5 p.m. Sunday and until curtain time before concerts.

NON-SINGERS WELCOME: When Windy City Performing Arts puts out a call for volunteers, it's usually looking for singers.

While the choruses are expanding, they need help from non-musicians: volunteers to handle marketing, group ticket sales, grant writing and other projects as well as daytime office help twice a week.

Contact Sam Heller, executive director, at (312) 404-9242.

SPRECHEN SIE NEUE MUSIK? Chicago's Goethe Institute is presenting a free concert of new music at 6 tonight in its headquarters, 401 N. Michigan.

The program will include a quartet for saxophones by DePaul faculty member George Flynn. Call (312) 329-0915.

Republic recently released a collectible gift set of Chaplin's early shorts for \$59.98.

The four-volume set features 12 early works including my all-time favorite, "The Rink," a hilarious story made thrilling with incredible roller skating stunts.

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ANDY GARDNER

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Composers' Discord: Musicians and Mental Illness

CHICAGO

Music may have charms to soothe a savage breast, but it ultimately tortured the deteriorating minds of composers Maurice Ravel and Robert Schumann, said experts at a symposium on music and the brain.

The illnesses of two of the most famous composers ever to suffer from brain ailments indicate how the brain learns music and illustrate how far science has come in dealing with brain injuries and illnesses that affect musical abilities, experts said.

The aim of the three-day conference last month was to stimulate cooperative research among experts in psychiatry, psychology, mu-

sic, education and communications. In the case of Ravel, the French composer who died in 1937, a mysterious brain deterioration robbed him of some musical abilities but not others, said Justine Sergent, director of the Cognitive Neuroscience Laboratory at the Montreal Neurological Institute. "He could generate melodies and harmonies in his head, but he was unable to write them down on a score, to play them on a piano or to sing them," she said.

Nothing was wrong with Ravel's muscles or voice. But his brain malfunction kept him from being able to sight read and play from memory, while allowing him to perceive pitch and rhythm, she said.

To learn the areas of the brain associated with the aptitudes Ravel retained or lost, Sergent tested blood flow in the brains of

10 musicians as they performed various musical tasks requiring those aptitudes. That showed the problem was most probably in a particular area on the left side of the brain, she said. The tests also showed that, contrary to previous assumptions, sight reading music uses different parts of the brain than reading words, she said.

In the case of Schumann, the German composer who died in 1856, the problem included severe depression, excited agitation and intermittent hallucinations.

"The sick man reported that he heard the tone 'A' constantly ringing in his ears. He heard entire symphonies repeating themselves," said Peter Ostwald, a psychiatry professor at the University of California School of Medicine in San Francisco.

Schumann attempted suicide by throwing himself into the Rhine River, prompting his admission to the mental hospital where he spent the last two years of his life before dying at age 46, possibly from self-starvation.

When he wasn't psychotic, he could compose beautifully and coherently and even played chamber music with Johannes Brahms, a rising star heralded by Schumann and who visited him in the hospital. Schumann's affliction was diagnosed at the time as "softening of the brain," Ostwald said.

He said Schumann's career-long pattern of explosive bursts of composition followed by periods of prolonged depression suggest the composer might have had a brain ailment called a temporal lobe disorder.

— Associated Press

Music on the brain

Creativity symposium offers an earful on how a talented mind conducts itself

By Jon Anderson

Offering advice to a class of graduating music students, pianist Glenn Gould once recalled a curious incident that happened when he was 13. He was practicing at home, learning a fugue by Mozart, when a cleaning woman started up a vacuum cleaner. The conjunction of sounds somehow imprinted the score on his mind. Ever after, whenever he was in a hurry to memorize a new work, Gould always arranged for contrary noises—"TV Westerns, Beatles records, anything loud"—to focus what he called "the inner ear of my imagination."

Such work habits give rise to substantial questions. Is there something about the mind of a musician that is different from, say, that of a hockey player, an accountant, a politician or a writer? What exactly is involved in learning to play music? What areas of the brain are brought into play by music? How is musical ability affected by brain injury or disease?

Those avenues for discussion are expected to lead about 1,000 people to some interesting conclusions when "Music and the Brain," the second in a national series of conferences on the sources of creativity, is held Nov. 16 through 18 at the Art Institute of Chicago. Anyone can listen in, for a \$195 fee, and, as show organizer Andrea Gellin Shindler dryly noted last week, "all proceedings will be in English." That means jargon will be held to a minimum.

In lectures, panel discussions, three luncheons, concerts, museum visits and backstage tours of Orchestra Hall, the gathering will offer an ensemble of music theorists, performers, composers, psychiatrists, therapists, neurologists and educators. Among the four dozen participants and consultants are cellist Yo-Yo Ma, neurologist Oliver Sacks, composer Shulamit Ran and Henry Fogel, executive director of the Chicago Symphony Orchestra.

"The last [conference], on 'Art and the Brain' in 1988, was so exciting," said Joanne Donda, a staff member of the School of the Art Institute, a conference sponsor. "We had 700 people from all over the U.S., Canada, Europe, Mexico, South America. A lot of high-level energy. This one should have the same."

One high note will be Dr. Justine Sergent, a neurologist at the Montreal Neurological Institute. She recently wired the brains of 10 pianists to measure changes in cerebral blood flow as they sight-read a musical score, played an obscure set of variations by Bach and listened to



Is the mind of a musician different from, say, that of a hockey player?

Illustration by Tracey Berghard

tapes of their performance.

Although classical musicians report that they can read scores with the same facility with which other people read books, Sergent found that such sight-reading had more to do with spatial perceptions—with spotting the specific locations of notes and the spaces between them—than does book reading, in which all letters have much the same intensity.

Often, she found, musical tasks required simultaneous but diverse actions, dispatching a flow of instructions to the brain and binding those areas needed both to perform and coordinate tasks. For example, "if they were reading music and listening at the same time, a [third] area was activated," Sergent said. "Listening or reading alone didn't involve this area."

Sergent came away from her experiments with a sense of wonder about how musicians play music they have never seen, a facility she called

"one of the most complex operations we know. You have to concentrate completely to do it." But also of interest in understanding the creative workings of the brain is what happens to musicians whose wiring goes awry.

At the symposium, using hospital records, Sergent will discuss the case of Maurice Ravel, who died in Paris in 1937 after a mysterious illness ended his career as, arguably, the leading French composer of the early 20th Century.

Peter Ostwald, author of "Schumann: The Inner Voice of a Musical Genius," will deal with a similar musical-medical mystery, Robert Schumann, who decided to become the greatest pianist of all time, but somehow wrecked the middle finger of his right hand, perhaps by using an artificial device to make it more flexible. One

See Music, pg. 2

'In Love and War'—and now in politics

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Music

Continued from page 1

remedy he tried, which didn't work, was to thrust his ailing hand inside the warm intestines of freshly killed animals.

Like sports medicine, and its attempt to heal particular ailments of athletes, a growing field of modern medicine deals with injuries to the bodies and spirits of musicians.

Musicians can suffer from wrist pains, hand numbness, shoulder cramps and strain from working in orchestra pits where there is little room, says Frank Wilson, a neurologist at the University of California School of Medicine and author of "Tone Deaf & All Thumbs?" a guide to ways the brain functions in perceiving and creating music.

Problems are seldom the fault of the instruments. Unlike such newfangled inventions as the computer terminal, whose capacity to maim has not yet been determined, musical instruments have evolved over hundreds of years of trial and error. Yet matchings with players can go awry, sometimes in mysterious ways.

In 1964, after a concert in Los Angeles, pianist Gould abruptly stopped playing in public and "worked for a year trying to regain his skill," Wilson said in an interview.

"Though [his biographer] Otto Friedrich laughed it off as part of his neurosis, it is clear from Gould's [just-released] diary that it was focal dystonia, like writer's cramp, a malady not described at the time. Gould solved the problem by retraining himself. He wrote 200 pages about it."

When something goes wrong

To brain scientists, the mournful problems of musicians are, perhaps, more interesting than their triumphs, revealing much about workings of the brain.

"Neuroscientists have clearly established that certain areas of the brain, particularly in the right hemisphere, play an important role in the reception and production of music, such as singing, playing instruments and composing," Howard Gardner, a Harvard psychologist noted for many educational theories, said in an interview.

"We know about this both from the study of musicians who have sustained brain damage and from studies of the blood flow and brain waves of 'intact' musicians."

"We do not know whether these individuals had brains that were already different at birth, nor whether their brains have a different anatomy in adulthood. But it is likely that the ways in which musicians process musical information in their brains is different from the ways that non-musicians process similar kinds of information."

If someone is good, or poor, in music, one can't infer that he or she will be talented, or impaired, in other areas. "Even the fabled relation between musical and mathematical skills is probably spurious," Gardner said. "While many mathematicians are interested in musical patterns, there is little evidence that gifted musicians have any special mathematical talents."

"We are similarly ignorant about whether individuals who become accomplished musicians have a different genetic constitution from those who do not. The accumu-



Henry Fogel: "We have to develop audiences for now—and for 20 years from now."

ling evidence that most intellectual and personality traits are at least partially inherited makes it likely that musical talent is partially inherited. Lacking studies of twins, we cannot say for sure."

Thus far, few researchers or therapists have turned their attention to helping musicians and composers overcome brain damage and get back into the swing of things, noted Todd Judd, a neuropsychologist at Seattle's Pacific Medical Center. "If a musician has a stroke, you have to take into account, in planning rehabilitation, the particular nature of the skills involved," he said. "What's missing? What's possible? Can you compensate? Retrain?"

For example, Judd said, "If a musician plays by ear and from the page, and has a memory deficit, you can encourage going to sheet music."

Starting from scratch

Other problems have to do with a despair common to musicians whose egos are intertwined with musical ability.

Judd goes back to basics, as he did recently with a jazz guitarist and pianist who, after suffering a head injury in a fall, had difficulty paying attention. "He was distraught," Judd said. "He couldn't play in pickup jazz bands in noisy smoky clubs anymore. He got distracted during improvisations. So I sent him back to practice. He got his technique back in a few weeks, but he said, 'It's no good, I can't jam.' I had him play tapes, chord along."

"When he felt confident, he added little runs. He got a solo gig as a pianist at a restaurant, playing new-age music, where you get on a chord and noodle around forever. He jammed with friends at home, eased back into clubs step-by-step, and got to where he could almost do everything he did before."

Jeanne Bamberger, a Massachusetts Institute of Technology professor of music, set up a classroom for children who had problems learning to read and write. Strangely, she found many of them had extraordinary abilities with Legos, wooden blocks and foam rubber when it came to making, fixing or building things with their hands. They quickly identified patterns and rhythms. They also loved musical games.

"I had two kids with severe auditory deficits. They could not follow verbal instructions," Bamberger said. "To my amazement, when I gave them a music jigsaw puzzle, 'Hot Cross Buns' jumbled up, they quickly put the tune back together."

Bamberger had children clap

their own rhythms and find a way to make a representation, their own notation, that would allow other youngsters to clap the same rhythm later. They did it using everything from computers to rods of varying lengths. This suggested to Bamberger that the problems did not involve poor listening or not remembering instructions.

"It had to do with giving chunks of information that were meaningful, structurally coherent and large enough to make sense," she said. "The critical thing was that these kids were paying attention to features that were consistent and sensible to them, but different from the textbooks."

Studying how children processed musical information, teachers learned to teach them. "Music triggered some basic conceptual issues," Bamberger said. "Like what you take to be an entity? What makes a boundary of a thing? What defines the degree of something? The kids were intrigued with these questions."

Robert Root-Bernstein, a Michigan State University physiologist and MacArthur Prize fellow in 1981, will discuss "Music, Intelligence and the Scientist" at the conference.

"A dozen years ago, I started reading biographies of hundreds of scientists, trying to find out what makes Nobel Prize winners work," he said. "Lots of them, I found, talked about the arts." The idea, proposed by author C.P. Snow, of a culture war between the sciences and the arts "wasn't holding up," he said.

Harmony with science

Root-Bernstein found two dozen examples of major scientists with second careers in music, notably Russian chemist Alexander Borodin, also a composer.

"Music is, to a large degree, intuitive, but it's also obvious that there are structures to music which creators have to make and performers have to reproduce," said David Epstein, a composer and conductor who is a professor of music at MIT. "Creating a piece of music, studying it, planning to interpret it, you come up with all kinds of profound questions. How do I happen to hear this piece? Where are its strong accents? How does the piece move? What's a good tempo? Or a right tempo? How do I know it's right?"

Success in the field requires a sensitivity to sound and a keen sense of time. "Music is the essential time art," Epstein noted. "It structures time. It puts in motion certain time processes." Also useful is a sensitivity to the structure of music. "Some people can scan a column of type and pick out essential ideas. Others have to go through and digest. Sight-reading music is the same. There are degrees of inborn gift."

The CSO's Fogel said that one area he hopes will be explored at the conference "is the relationship between arts training and the development of creativity and problem-solving abilities." What Fogel had in mind is a current sour note, the national trend toward cutting back on school music programs, which, he warned, could impede the flow of young musicians and hinder development of future audiences.

"In the business I'm in," he said, "we have to develop audiences for now—and for 20 years from now." You can't create music in a vacuum, Fogel was saying, although, as Glenn Gould might have added, having one around can help.

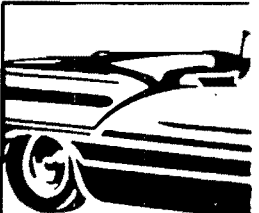
For more information on the symposium, call 312-443-7308.



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Symposium to study brain, musical ability

By TOM VALEO
Daily Herald staff writer

When she was a young speech therapist, Andrea Gellin Shindler worked with a young woman from Buffalo Grove who had suffered a massive cerebral hemorrhage that damaged most of the left hemisphere of her brain.

During the course of therapy, this woman, Carol Frankel, whose ability to speak had been devastated, developed an artistic ability that astounded Shindler. How did the brain injury stimulate this flowering of talent, Shindler wondered. What is the connection between brain function and creativity?

To seek answers to these questions, Shindler organized a symposium in 1988 titled "Art and the Brain." At her invitation, neurologists, psychologists, artists and others gathered at the Art Institute of Chicago to deliver public lectures on the most recent discoveries about how the brain works.

The symposium aroused so much interest that Shindler has organized another, titled "Music and the Brain," which will be held Nov. 16-18 at the Rubloff Auditorium at the Art Institute.

Two dozen speakers from the United States and Canada will speak during the three-day symposium, all of them offering a perspective on how the brain functions while creating and experiencing music.

"When I saw the effect of the 'Art and the Brain' symposium, I created the Foundation for Human Potential because I wanted to organize other symposia that would attempt to correlate brain function with various abilities," said Shindler, who is executive director of the foundation and lives in Chicago. "This is just a great opportunity for people from several disciplines to come together and try to figure out how the brain plays a role in creativity."

Much knowledge about the brain comes from studying people who have suffered brain damage from strokes or head injuries. By determining what part of the brain is destroyed, and then observing the deficiencies that result, scientists have managed to piece together a rather detailed map of brain functions.

"We can learn from artists who have sustained brain damage by studying what abilities they have lost, and how they have reorganized



Andrea Shindler, executive director of the Foundation for Human Potential, has organized a seminar titled "Music and the Brain."

Daily Herald Photo/Mark Welsh

the abilities that remain," Shindler said.

In this tradition, the symposium will include, on Nov. 17, a performance by Tony Deblois, a blind and autistic 18-year-old man who is, despite these challenges, an extremely gifted musician. (He is enrolled at the prestigious Berklee College of Music in Boston, where he is earning A and B grades even though his ability to communicate with words is severely limited.)

Deblois will perform two pieces — a classical selection, and Duke Ellington's "Take the 'A' Train."

And prior to the performance, Dr. Leon Miller of the University of Illinois, who is the author of a book titled "Musical Savants," will discuss the Deblois case, which he considers a striking example of "the extent to which musical ability is independent of other cognitive abilities."

At the "Art and the Brain" symposium, one of the most provocative talks was given by Dr. Antonio R. Damasio, who pointed out that our thoughts and perceptions are the result of several simultaneous brain functions that somehow merge into a coherent, unified experience.

Damasio and his wife, Hanna

Damasio, are doing groundbreaking research at the University of Iowa, where they use magnetic resonance imaging and other techniques to provide dramatic pictures of the brain in action. Damasio will talk about some of their results at the "Music and the Brain" symposium on Nov. 18.

This idea that the brain performs several parallel functions at once is a "hot topic" in brain research, according to Dr. John Brust of Columbia University in New York, who will provide an overview of research at the beginning of the symposium on Monday. "I think the magic word regarding brain functions is 'network.' We have this vast assembly of nerve cells that operate over space and time simultaneously. This type of parallel processing is a fundamental difference between the brain and computers."

Shindler organized her first symposium to learn how the brain produces art, and she believes the "Music and the Brain" symposium will also yield valuable insights. But she no longer believes that creativity and artistic achievement can be explained by a study of brain function alone.

"I used to think that everything an

artist did could be tracked in the brain, but that's not true," she said. "You must consider lots of other things — motivation, what activities the society considers important, what kind of support is available to the artist. One of the foundation's consultants, (the classical cellist) Yo-Yo Ma, said that musical talent goes far beyond ability. It depends on motivation, family involvement, determination, stamina — lots of other things. So you can't trace artistic ability entirely back to the brain, but you can't separate it from the brain either."

Registration for the "Music and the Brain" symposium begins at 7:45 a.m. Monday outside of the Rubloff Auditorium of the Art Institute (Columbus Drive entrance). Shindler's welcoming address is at 9 a.m., followed by six lectures lasting until 4:20 p.m., with a lunch break and two coffee breaks.

Lectures on Tuesday and Wednesday run from 9 a.m. to 4 p.m. The cost of the symposium is \$195, or \$95 for medical residents, students and senior citizens.

For information and a brochure, call the Foundation for Human Potential at (312) 528-2488.

Ravel, Schumann Offer Clues to Mental Illness

By Brenda C. Coleman
Associated Press

Music may have charms to soothe a savage breast, but it tortured the deteriorating minds of composers Maurice Ravel and Robert Schumann, experts at a symposium on music and the brain said here this week.

The illnesses of two of the most famous composers ever to suffer from brain ailments could provide clues into how the brain learns music. They also illustrate how far science has come in dealing with brain injuries and illnesses that affect musical abilities.

The aim of the three-day conference—sponsored by the Foundation for Human Potential, the Chicago Symphony Orchestra and the School of the Art Institute of Chicago—was to stimulate cooperative research among experts from varying fields, such as psychiatry, psychology, music, education and communications.

In the case of Ravel, the French

composer who died in 1937, a mysterious brain deterioration robbed him of some musical abilities but not others, said Justine Sergent, director of the Cognitive Neuroscience Laboratory at the Montreal Neurological Institute. "He could generate melodies and harmonies in his head, but he was unable to write them down on a score, to play them on a piano or to sing them," she said.

Nothing was wrong with Ravel's muscles or voice. But his brain malfunction destroyed some abilities, including being able to sight-read and play from memory, while leaving intact his ability to perceive pitch and rhythm, she said.

To learn the areas of the brain associated with the aptitudes Ravel retained or lost, Sergent tested blood flow in the brains of 10 musicians as they performed various musical tasks requiring those aptitudes.

That showed the problem was most probably in a particular area on the left side of the brain, she



Robert
Schumann



Maurice
Ravel

Composers suffered brain ailments

said. The tests also showed that contrary to previous assumptions, sight-reading music uses different parts of the brain from reading words, she said.

In the case of Schumann, the German composer who died in 1856, the problem was mental illness, which included depression and hallucinations.

"The sick man reported that he heard the tone 'A' constantly ringing in his ears. He heard entire symphonies repeating themselves," said Dr. Peter Ostwald, psychiatry professor at the University of California School of Medicine in San Francisco.

Schumann attempted suicide by jumping into the Rhine River, prompting his admission to the mental hospital where he spent the last two years of his life before dying at age 46, possibly from self-starvation.

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2 Composers' Mental Pain Illumines Brain

Scientists, Humanists Study Ravel, Schumann

By Brenda C. Coleman

Associated Press

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Robert Schumann



Maurice Ravel

In the case of Schumann, the German composer who died in 1856, the problem was mental illness, which included depression and hallucinations.

"The sick man reported that he heard the tone 'A' constantly ringing in his ears. He heard entire symphonies repeating themselves," said Dr. Peter Ostwald, a psychiatry professor at the University of California School of Medicine in San Francisco. "And in thus losing control over the sounds in his head, Schumann was suddenly assaulted by great

blasts of noise, horrible distorted shrieking animals, interrupted by angelic singing and the demonic voices of dead composers."

Schumann attempted suicide by jumping into the Rhine River, prompting his admission to the mental hospital where he spent the last two years of his life before dying at age 46, possibly from self-starvation.

When he wasn't psychotic, he could compose beautifully, and even played chamber music with Johannes Brahms, a rising star who visited him in the hospital.

An autopsy by the primitive standards of the day revealed little that is useful for identifying Schumann's affliction, which was diagnosed at the time as "softening of the brain," Ostwald said.

He said Schumann's career-long pattern of explosive bursts of composition followed by periods of prolonged depression suggests he might have had a brain ailment called a temporal lobe disorder.

"One can only hope that better understanding of the lives and brains and minds of musicians . . . will lead to better treatment methods, so that great artists like Robert Schumann can be kept alive, healthy and creative," Ostwald said.

Tedd Judd, a neuropsychologist from Puyallup, Wash., who gave a talk Wednesday on the rehabilitation of brain-damaged musicians and artists, said the conference might eventually benefit music education.

"This field and this type of work are helping us to understand the thinking processes that go into learning music and to participating in music," he said. "And if we can understand those processes better, my hope is we can make it more accessible."

Media Articles: ART & THE BRAIN



THE FOUNDATION FOR HUMAN POTENTIAL

NEUROLOGY

A glimpse of how mind produces art

Brain-damaged artist raises new questions on the elusive relationship between mind and brain

By Tom Valeo
Special to the Globe

On Oct. 31, 1973, a blood vessel burst in the left hemisphere of Carol Frankel's brain. She slipped into a coma and would have died without a risky operation in which doctors removed clotted blood to relieve pressure on her brain. But when she left the hospital eight months later, the entire right side of her body was paralyzed and she was unable to speak.

The woman, then only 20, went to live with her

parents in suburban Chicago. Returning to college was out of the question, so, with nothing to do, she took her mother's suggestion and signed up for oil painting lessons. It did not look like a promising hobby; Frankel had never displayed any artistic talent, and although right-handed, she would have to paint with her left hand.

Within a few months, however, Frankel was producing pictures so accomplished that her speech pathologist began to wonder if the brain injury had somehow stimulated her perceptions.

"I knew I couldn't do with my right hand what Carol was doing with her left," said Andrea Gellin

Shindler, now a research associate in the neurology department at Michael Reese Hospital and Medical Center in Chicago. "I thought that perhaps when she could no longer communicate through speech, she developed this ability to communicate through paint."

There was evidence to support her theory. Some autistic children who lack the ability to speak produce vibrant drawings. Nadia, a profoundly autistic child born in 1967 in England, astounded psychologists with her precocious pencil sketches, but

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Globe photo/Michael Meinhardt

Carol Frankel displays one of her paintings.

Searching for answers on how the mind produces art

■ BRAIN

Continued from Page 46

after the age of 9, when she began to speak, Nadia lost interest in drawing. The same thing happened to Frankel; when she recovered some ability to speak, her interest in painting waned.

Eventually, Shindler found a possible explanation for Frankel's rapid development in "Drawing on the Right Side of the Brain," by Betty Edwards, who teaches drawing at California State University in Long Beach.

According to Edwards, most people who draw produce stereotyped or idealized notions of what something looks like. Images generated by the brain's left hemisphere, which psychologists characterize as the logical, problem-solving side. Instead of drawing the face of a person sitting nearby, for example, most people create generic features that bear little resemblance to the person nearby. Edwards frustrates this tendency by having her students copy a drawing hung upside down, a tactic that precludes relying on mental stereotypes and forces the brain's more creative right hemisphere to take over.

"The reason for this is unclear," Edwards said. "But whatever the explanation, it works."

Changing sides

The effectiveness of Edwards' technique prompted Shindler to wonder if something similar had happened to Frankel. Perhaps, like a student confronted with an upside-down picture, she had been forced by her injury to use her right hemisphere, which contained some dormant artistic talent.

For years, Shindler considered writing a case study about Frankel's blossoming artistic ability, but with research on the brain accelerating so rapidly, she decided instead to invite neurologists, psychologists, artists and specialists from other fields to participate in a symposium. Held last year at the Art Institute of Chicago and co-sponsored by Michael Reese Hospital, it was titled "Art and the Brain" and brought together nearly two dozen speakers who provided tantalizing clues to the mystery of Carol Frankel's artistic talent.

One premise put forth early in the symposium shaped all subsequent discussion: Creativity is not a function of the brain; it is a function of the mind, and the mind is a creation of society.

"Children come into the world mindless, but not brainless," said Elliot Eisner, professor of education and art at Stanford University. "Socialization, acculturation and education bring the mind into being. The mind is a cultural achievement."

Creativity in context

If creativity is a product of the mind, psychologists agree, searching for creativity in the brain is as futile as looking for the soul in the body. Creativity exists only in the context of society, which defines and rewards creative activity, said Dr. Howard Gardner, professor of education at Harvard University and co-director of Project Zero, an academic think tank devoted to the study of creativity.

"There can be no such thing as a hermit creator," said Gardner. "Psychologists tend to view Picasso as a solitary genius who created Cubism in isolation. In this view, the artist was born with creativity, and if we knew enough about the brain, we'd know exactly where to look for it. But it's simplistic to try to locate artistic creativity in the brain."

Instead, like all creative people, Picasso functioned within a "domain" — a discipline or craft valued by the society, Gardner said. Also, Picasso was subjected to judgement by the "field" — that collection of critics, teachers and others who recognized that Cubism was an extraordinary breakthrough and defined Picasso as a genius.

This perspective suggests that, for Carol Frankel, brain damage did not produce artistic ability. Rather, her disability caused her to enter a new domain — painting — where she could apply her ferocious determination to master a new skill. She began to paint well enough to earn praise; in other words, her success probably resulted from motivation and concentration, not from a physical alteration of her brain. In fact, many psychologists believe there is little difference between the brain of a brilliant creator and that of an ordinary person.

"If we're ever able to scan the brain of an artist at work, we're less likely to find anatomical differences than processing differences," said Gardner.

Epilepsy and emotion

But there is one brain disorder that may stimulate artistic production — temporal lobe epilepsy. The temporal lobe, said Dr. David Bear of the Vanderbilt University School of Medicine, plays a crucial role in motivation and emotion. The amygdala, an almond-shaped structure within the temporal lobe, seems to act as a modulator between perceptions and the emotional responses to them. But the temporal lobe is extremely susceptible to the "electrical mischief" caused by seizures.

"In the epileptic, the amygdala and other structures in the temporal lobe may become overactive, so sensory signals call up strong emotions," Bear said.

Some temporal lobe epileptics, for example, develop hypergraphia — the compulsion to express themselves at length through writing. One person with this syndrome wrote 10,000 pages in a few weeks. "Removing the amygdala can take that urge away," he said.

Some temporal lobe epileptics — Van Gogh and Dostoyevsky, for example — have highly active amygdalas that send to the prefrontal lobe "messages that the world is suffused with momentous, significant events," Bear said. "This triggers moral, religious and philosophical preoccupations, and the desire to express oneself in truly remarkable ways. There's evidence that St. Paul, Moses and Muhammad were epileptics. Maybe this could lead to transcendent artistic production too."

In Frankel's case, the brain injury caused convulsions, and she remains vulnerable to seizures, said Dr. Nicholas J. Manno, the Rockford, Ill., neurosurgeon who performed the operation that saved Carol's life. Consequently, he said, her emotions probably have been affected. "My guess is that her emotional response is not always appropriate," he said.

Although temporal lobe epilepsy may stimulate the urge to create, specialists agree that any destruction of brain tissue will prob-

ably impair artistic ability. However, even after brain damage, many artists swiftly learn to compensate, an indication that brain functions are not neatly localized, as psychologists have long believed.

Even speech, long thought to be controlled by a small portion of the left frontal lobe, is much more complex. Computerized brain scans conducted on conscious patients show that, during speech, the portion of the left hemisphere that French surgeon Paul Broca identified in 1860 as the source of human speech is very active indeed. But the right hemisphere is equally active, said Dr. Elliott D. Ross, professor of neurology and psychiatry at the University of Texas in Dallas.

The right hemisphere, Ross said, interprets the "melody line" of speech, those inflections that clarify the meaning of words. People who suffer strokes in that region can still speak, but only in a flat, emotionless way, and they cannot detect emotion or irony in the speech of others.

The parallel brain

Research demonstrates that the brain processes information in a parallel, not a linear fashion. Until recently, many psychologists assumed that sensory data passed from one region of the

brain to another. An image on the retina, for example, would pass in a linear fashion through regions that distinguish color, form, depth and so on, with the perception becoming more sophisticated as it progressed.

"That view is no longer tenable," said Dr. Antonio Damasio, head of the neurology department at the University of Iowa Hospitals and Clinics in Iowa City. He offered the example of an artist who in 1978 suffered a small stroke in the right visual cortex at the back of the brain, which left him unable to see color in his left visual field. The artist's visual acuity remained as sharp as before, and he could still interpret what he saw. Only his color vision was affected.

"If this can happen," Damasio said, "it is not possible to conceive of sequential processing in the brain. Obviously, the brain farms out work to various regions simultaneously." How the brain re-assembles these parallel operations into a single, unified perception remains a mystery, he added.

But it is the brain's ability to synthesize perceptions that lies at the heart of artistic creativity, said Dr. Jerre Levy, a neuropsychologist at the University of Chicago. That is why she believes that the corpus callosum - the bundle of fibers connecting the two hemispheres - is probably larger in highly talented artists than in other people.

With Carol Frankel, brain damage did not enlarge the corpus callosum, which is genetically determined, and no one claims that the injury created her artistic talent. The most logical conclusion is that the injury caused Frankel to develop abilities she already possessed, abilities nurtured and expressed through art, said Stanford's Eisner.

"The development of the mind depends on what we've been exposed to," he said. "That's why art should be singled out for attention - art is a means for cultivating the mind."



Photo courtesy/Project Zero
Howard Gardner of Harvard does research on creativity.

Tom Valeo is a journalist who lives in Arlington Heights, Ill.

Disorder or genius? In art, a profound debate

By Theodore Berland

"The more disturbed I am, the more I function as an artist."

Thus Vincent Van Gogh expressed better than any of his fellow artists the popular image of the "crazy artist." The quote is especially fitting since he is the archetype. Cutting off his own ear and sending it to a lover made him at least as famous as his explosively colorful flowers and landscapes.

Van Gogh was not the only famous painter who was mentally disturbed and who fortified the public's stereotype. But the preponderance of painters who are emotionally stable makes the point that an artist need not be crazy to be innovative.

As an epileptic, Van Gogh is also the archetype of the person with organic brain lesions whose disease is reflected in his art. The relationship of emotions and brain lesions to painting is intimate. The brain is the seat of emotions as well as the seat of creativity, perception, and manual dexterity.

To explore these connections, a symposium called "Art and the Brain" was held in mid-May at the Art Institute of Chicago under the joint sponsorship of its school's Department of Art Education and Art Therapy, and Michael Reese's Department of Neurology.

The idea for the symposium was that of Andrea Gellin Shindler, research associate with Michael Reese's Neurology department. As a speech pathologist, she worked with Carol Frankel, who had suffered a stroke 14 years before, as a 20-year-old college student.

The cerebral hemorrhage left Ms. Frankel unable to move parts of her body and unable to speak. Therapy improved both of her disabilities but did not restore them. To express herself in another mode, she took up painting. Ms. Shindler noted that where Ms.

Frankel had been right-hand dominant before the stroke, she now painted with the left hand; where she had shown no talent for painting before the stroke, she now produced interesting, attractive landscapes.

So fascinated was Ms. Shindler by these phenomena that she interested several authorities, especially her chairman, Dr. Daniel B. Hier, and Don Seiden, then chairman of the Art Institute's Art Therapy department, in hosting the symposium, and then she raised funds to underwrite it.

No one was more surprised than the three of them when the symposium was deluged by an unexpected 750 attendees—physicians, artists, art educators, art therapists, and students. Most were Americans, gathered from Hawaii to Boston. There were also Canadians, and visitors from as far away as Italy, Denmark, and England.

The program consisted of 20 presentations made over a span of two and a half days, plus an exhibit of art by patients with mental and physiological brain disorders (see box).

The presentations fell into three categories: the connections between art and the brain, the mental health of artists, and the art of the mentally disabled and brain-damaged.

Neurologist Hier set down physiological anchors by emphasizing that art relies on the brain's ability to direct: manual skills, visual perception, spatial manipulation, memory evocation, emotions, creative play, and signification. It does this primarily through two left-brain systems: gnosis, the recognition of sensory stimuli, or perception; and praxis, the ability to perform skilled motor acts. Each artist's work is unique because each person's brain is different, he said. "Each artist must find his own art form in his own personal tool kit."

Psychologist Howard Gardner, pro-



Carol Frankel in front of her art.



Andrea Shindler, director of the "Art and the Brain" symposium, talks with Dr. Louis Caplan, an attendee who formerly chaired the Neurology department at Michael Reese.

fessor of education at Harvard University and author of the book *Art, Mind, and the Brain*, elaborated his belief that creativity may not be wholly located in the brain but may be part of the whole person, and, further, involves more than one person. "There are no hermit creators," he said, "Cubism didn't spring out of Picasso's head just as psychoanalysis didn't spring out of Freud's head. Creativity does not spring out of anyone's head."

Rather, Picasso's development of cubism and Sigmund Freud's development of psychoanalysis were natural courses, built upon the work of others who came before them. Picasso started, as most artists do, by copying the styles of creative artists who had gone before him. "But by the time he was 20 he painted as well as anyone in the world," Gardner said.

He explained that cubism developed out of low-art forms, especially caricatures. Other famous artists had played with cubism before Picasso; he simply developed it further.

Pablo Picasso was a prime example of Prof. Gardner's definition of the creative individual: a person who regularly solves problems, or fashions products, in a way that is initially novel but eventually becomes accepted in at least one cultural setting. "A creative individual scans his domain to see where he fits, and then pushes it," he said.

Picasso, in turn, influenced other artists. One was Jackson Pollock. He had a love-hate relationship with Picasso, whom he adored and copied; yet he felt Picasso was his competitor.

According to Chicago art critic and historian Sue Taylor, Pollock was an alcoholic whose addiction began in high school. He lived most of his life in severe depression and was diagnosed as a schizophrenic. For treatment of these emotional disorders he turned to a long list of psychiatrists, starting in 1937, none of whom cured him.

Pollock's work began, as does that of other artists, by mimicking the greats who went before him, including Picasso. So Pollock's early work was representative. His later work was quite primitive, essentially large can-

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The exhibit illustrated the issues

Sixty paintings by 14 artists almost stole the show at the "Art and the Brain" symposium. Not as controversial as a student's painting of the late Mayor Harold Washington which hung in a nearby room, the exhibit demonstrated in a purely graphic way the effects of brain pathology on art. The exhibit was put together by co-curators Wendy Heller and David Henley, with help from Dr. Daniel Hier, Don Seiden, and Andrea Shindler. Among the works exhibited, in addition to those of Carol Frankel, were these:

—A prolific and successful painter of movie posters in the 1960s and 1970s, Reynold Brown suffered a right-hemisphere stroke in 1976. This affected the fine motor skills of his dominant left hand and his visual spatial abilities. He learned to draw with his subordinate right hand, but there were large gaps of empty space in his first post-stroke drawings. Over the years he has learned to overcome this.

—Nadia, an autistic British child, was a precocious artist who, at the age of three years made drawings of incredible accomplishment. Her work challenged the assumption that the ability to draw must follow an

orderly progression through developmental stages. But her drawing ability deteriorated as the severity of her autistic symptoms lessened.

—Carolyn Stuart, an art student, suffered a severe head injury at the age of 19 years and developed temporal lobe seizures. The visual impact of color and texture in her abstract painting gives them the power to communicate as well as did her earlier work.



Nadia's work at six years of age.

Michael Reese News

Contributing Writers

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Ivan R. Dee
Director of Public Affairs

Symposium seeks creativity roots

continued from page 2

vases laid on the floor onto which he dripped paint. The quote from Van Gogh about being a better artist when he was disturbed also applied to Pollock. Some psychoanalytically oriented observers likened his dripping techniques to the fecal smearing of (other?) repressed mental patients.

Ms. Taylor said that according to one observer, Dr. Antonio Damasio, the changes in Pollock's paintings may have been the direct result of gradual brain damage caused by heavy and constant consumption of alcohol. If that is the case, his abstract expressionism may have been the creative result of the neurological dimming of higher controls and "more primordial type of cognitive and neural organization."

This may also have been true of Van Gogh, according to psychiatrist Dietrich Blumer of the University of Tennessee. "It can be shown that Vincent's illness, except for rather brief periods, did not impair but rather enhanced his creativity," he said. "While in Paris and before his departure for Arles where he was to paint perhaps the most intense paintings ever produced by an artist, he began to suffer from episodes of sudden terror, of peculiar epigastric sensations, and of lapses of consciousness. His use of absinthe, an alcoholic beverage with convulsant properties, most likely played a role in the precipitation of his illness," which was diagnosed as temporal lobe epilepsy.

This makes sense, in the view of psychologist Wendy Heller of the Department of Psychiatry, University of Chicago. "Art is as much a language of emotion as it is a collage of skilled brush strokes and superb spatial relationships," she observed. "Not only do emotional functions of the brain continue to influence and enhance the artwork of individuals with damage to the brain, but they affect the creation of art by non-brain-damaged individuals."

"This can be seen in certain aspects of composition, and the effects seem to be due to different patterns of brain activity during different emotional states. It has been found that when a person is sad or depressed, frontal regions of the right hemisphere are more active than the same parts of the left hemisphere, but when a person is cheerful or happy, frontal regions of the left hemisphere are more active than the same parts of the right hemisphere."

She added, "The emotional organization of the brain affects the perception of pictures as well as the creation of art. Apparently the right hemisphere has a more negative, sad, and pessimistic view of the world, whereas the left hemisphere has a more positive, cheerful, and optimistic view of the world."

Drawing is not the problem, according to Betty Edwards, art professor at California State University, Long Beach, and author of the popular book



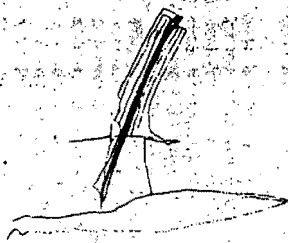
Don Seiden, art advisor, explains the exhibit to National Public Radio.

Drawing on the Right Side of the Brain. The problem is seeing. "In the history of creative endeavors, *envisioning* is a recurrent theme. To cite a few well-known examples, [physicists] Albert Einstein, Neils Bohr, and Richard Feynman all spoke of seeing the solutions to problems in the form of images, visual formulations, or diagrams before rendering the results of thinking into linear languages," she said.

"Realistic drawing requires learning to see with some accuracy what is actually in front of the eyes. Most artists agree that acquiring basic perceptual

skills is essential to later work, just as acquiring basic language skills is essential for writers." The basic trick, in her view, is to gain access to the image-forming right side by presenting the brain with a task that the normally dominant and verbal left side will turn down.

One conclusion was agreed upon by most participants of the conference: the yeasty exchange between the various disciplines deserves to be pursued. Other formalized discussions of the relationship between art and the brain may be in the offing.



Two views of the same windmill by the same artist: left, before Alzheimer's disease; right, after.

Foot- notes

The alliance of editor and writer may be the quintessential love-hate relationship. Between two people who think they know how to write, few things are touchier than conflicting ideas about the best way to express an idea. On the other hand, what would editors and authors ever do without each other?

At last week's annual meeting of the Association of American University Presses, a long-time editor at the University of Toronto Press and a professor of history with several books to his credit testified to the prickliness of the partnership between editor and author. Oddly enough, the editor pointed to occasions when less editing might be called for, and the author actually asked for more.

"We should beware of editing as craft for craft's sake," said Ian Montagnes, editor in chief at the Toronto press.

In fact, he questioned the extent to which editors, of scholarly works in particular, had the right to turn a manuscript into something more than the author had made it.

He related a story about a copy editor who had noticed that a particularly complicated manuscript was lacking a substantial number of necessary explanatory notes. She labored long at flagging all the places where notes were needed, and thus created the opportunity for the author to correct what would otherwise have been a glaring deficiency in the finished work. When the reviews of the published book came out, Mr. Montagnes said, the notes were singled out for praise.

In a sense, said Mr. Montagnes, good writers and scholars subsidize the editorial labor that goes into improving the work of negligent authors like the one he described. That subsidized labor, in turn, helps to put less competent scholars on a more nearly equal footing with better ones for tenure, promotion, and other academic prizes.

"By leveling the field," he said, "we are inadvertently hurting the better scholar."

Sometimes, though, even good authors need that kind of editorial labor of love.

William S. McFeely, a historian at the University of Georgia, described a grueling trial with a particularly demanding copy editor—he wishes now he had counted all the little yellow slips attached to the pages of his manuscript when she was through—that became, he said, "one of the most extraordinary intellectual experiences of my life." The book she worked on, a biography of Ulysses S. Grant published by W. W. Norton and Company in 1981, went on to win a Pulitzer Prize.

"It would be worth the risk," he told the assembled scholarly publishers, "for more university-press editors to assert themselves, and work with an author to make a promising book into a good one."

Scholarship

Creative Works by Neurologically Impaired Artists Provide Scientists With a Window on the Brain

Researchers say styles of van Gogh, Pollock, and others may have been influenced by their debilities



Antonio R. Damasio, U of Iowa: Jackson Pollock's abstract expressionism (in painting) may have been influenced by the neurological effects of alcohol.

By CHRIS RAYMOND

Art, it is said, lays one bare. It might also be said that the work of visual artists with neurological damage lays one's brain bare, illuminating how its structures contribute to that ill-defined process called creativity.

By serendipity or intent, neurologists and other scientists have been looking at such persons, both living and dead, as a window into the brain's inner workings.

No one has compiled a list of celebrated

artists who have suffered brain damage. But if such a list existed, it might well include such figures as Vincent van Gogh and Jackson Pollock.

Van Gogh is believed to have suffered from emotional and physical debilities, including manic-depressive illness and addiction to absinthe, that some think affected the content of his work.

Absinthe is distilled from an alcoholic steep of herbs, the principal constituent

being wormwood. Wormwood contains thujone, a chemical known to cause hallucinations. Van Gogh, like many Parisians of his time, was an avid absinthe drinker. Indeed, argues Wilfred N. Arnold, a professor of biochemistry at the University of Kansas Medical Center, van Gogh went beyond fondness to addiction.

Among other effects, heavy absinthe drinking can cause hallucinations and brain damage. Such an addiction might

MORE THAN 'MAD GENIUS'

Researchers Link Manic-Depressive Illness and Artistic Creativity

The American poet Robert Lowell won a Pulitzer Prize for his intense and often ironic poetry. He also underwent treatment 22 times for manic-depressive illness.

Robert Schumann, the German Romantic composer, set poems to music and wrote four symphonies. He, too, suffered from bouts of mania and depression that worsened in his later years. A classic study of his work, done in the late 1950's, showed that Schumann's production varied with his mood swings.

In years past, those cases might have been viewed merely as anecdotes about "mad genius," examples of the notion that psychic suffering is often the well-spring of great art. But as researchers make more systematic studies—and apply the insights of neuroscience—they are coming to the conclusion that the links between manic-depressive illness

and artistic creativity are more than coincidence.

Indeed, Kay Redfield Jamison, associate professor of psychiatry at the Johns Hopkins University medical school, goes so far as to say that "there is enough evidence to put writers and artists into a high-risk group" for manic depression and the suicides such illness often triggers.

Ms. Jamison has been investigating the links between artistic production and mood disorders. In extensive interviews with the artistic "cream of the crop"—42 award-winning playwrights, poets, novelists, and artists—rates of treatment for emotional illness (mainly, depression or manic depression) were "vastly elevated over what you'd expect in the general population," Ms. Jamison said. Ms. Jamison found that 13 per cent of novelists, 28 per cent

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Kay Redfield Jamison: "A list of poets, writers, and other artists" will reveal a history of institutionalization and suicides.

Works by Neurologically Impaired Artists Provide a Window on the Brain

Continued from Preceding Page

literally behave as though the left side of space doesn't exist."

Dr. Ross spoke at a symposium in Chicago last year on art and the brain.

This "neglect" arises because the right hemisphere takes on most of the work involved in directing attention to surrounding space. Conversely, the left hemisphere, which directs the motor and visual skills of the right side, has only limited ability to explore both sides of space, according to Daniel B. Hier, chairman of the department of neurology at Chicago's Michael Reese Medical Center.

Intensified Perceptions

Mr. Brown's wife, who is also an artist, tried many tricks over the years to cue her husband to attend to the left side of the canvas, none of which were completely successful, says Franz Brown, Mr. Brown's son. Nevertheless, with practice, his work showed increasing technical skill, even though the right sides of his drawings are always more heavily worked.

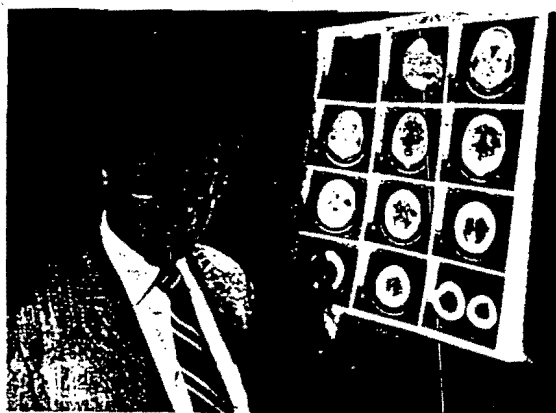
His style changed in a number of other ways, says Franz, a professional photographer and art critic. Earth tones changed to brighter, cleaner colors as Mr. Brown's perception of colors intensified. Although Mr. Brown had begun doing more portrait work and paintings of Western-motif landscapes before the

stroke, afterward he had to forgo portrait work because of his inability to do fine detail. Landscape painting turned more to the abstract as well.

Other artists, says Franz, liked Mr. Brown's more impressionistic post-stroke paintings, but Mr. Brown has remained frustrated "because he knew what he could do" before the stroke, his son says.

Carol Frankel's experience might be viewed as the flip side of Mr. Brown's: She suffered a stroke in the left hemisphere at age 20. Like Mr. Brown, Ms. Frankel had to teach herself to use her non-dominant hand, in this case her left. Something remarkable happened: She discovered a previously unexpressed artistic ability. Over the last decade, Ms. Frankel has refined her technical skills as a landscape artist, yet she has not fully recovered her ability to speak or move.

Although no one can be certain of the reason for Ms. Frankel's newfound artistic abilities, they do fit in well with prevailing thinking about brain specialization. In most right-handed people, the left hemisphere is dominant. This part of the brain specializes in logic and the syntactical meaning of language. Thus, damage to the left side of the brain commonly leads to an aphasia—an inability to speak, to write, or to read. Conversely, the right hemisphere typically specializes in processing emotions, including the emotional aspects of



David Bear, with CT scans of a brain: Temporal-lobe epilepsy "actually can create, de novo, artistic creativity."

language, and in perceiving the orientation of objects in space. The latter skill is considered by many to be an important one for visual artists.

Hence, when Ms. Frankel's damaged left hemisphere was unable to exert dominance, the visually creative abilities of her right hemisphere were, in essence, released to express themselves more fully, neurologists suggest.

Ms. Frankel's newly gained artistic skills may be somewhat unique among stroke patients, but they are not so uncommon among another

group of people: those who have temporal-lobe epilepsy.

Epilepsy afflicts about two million people in the United States. It is not a disease in itself, but rather a term that encompasses a variety of processes—such as head injuries, decreased oxygen flow, or infections—that can damage the central nervous system and result in recurrent seizures. Temporal-lobe epilepsy is so named because the seizures are focused in that particular part of the brain. The temporal lobe includes all of the lower half of the brain, so persons with seizures in this area can display a myriad of emotional or cognitive symptoms.

There are some commonalities, however, according to David M. Bear, associate professor of psychiatry and neurology at Vanderbilt University. Epileptic seizures occur when something either triggers, or eliminates the inhibition to, extremely rapid firing of electrical impulses across affected nerve cells. In effect, some of an epileptic's brain cells can be thought of as being "extra-excitable," Dr. Bear says.

Geometric Distortions

This, in turn, is manifested as greater personal intensity in a number of ways: strong temper, changes in one's sexual feelings, deepened spirituality, and religious conversions. This upturn in emotions is known as the "interictal syndrome."

What Dr. Bear and others are now beginning to learn is that temporal-lobe epilepsy "actually can create, de novo, artistic creativity," Dr.

Bear has treated a number of patients who developed a previously unknown talent in drawing, painting, ceramics. One is now a professional artist whose highly abstract canvases, Dr. Bear says, "illustrate philosophical currents flowing through her mind."

Also common in all his patients' work, says Dr. Bear, are geometric distortions and figures taken out of context, as well as use of intense color. He attributes those traits to two factors.

First is the role the amygdala plays. The amygdala is an almond-shaped structure that lies deep within the temporal lobe. It has been called the "sensory gateway to the emotions," because it is believed to play a key role in forming and recalling associations between sensations and emotions.

Second, one of the functions of the temporal lobe is to identify objects rather than locating them in space. In a person with temporal-lobe epilepsy, "the overactivity of nerve cells here could lead to being absorbed by the figure independent of the ground," Dr. Bear speculates.

'A Personal Tool Kit'

Dr. Bear says that, based on his experience and impressions from colleagues, there is a small but significant fraction of epileptic patients who develop serious artistic talent following the onset of the illness. He also believes, along with some of his colleagues, that the seizures van Gogh is known to have suffered were the result of epilepsy, although this is a point of some controversy among art historians.

If it is true, it could help to explain van Gogh's extensive diaries and correspondence (since one effect of this type of epilepsy is to evoke prolific, highly idiosyncratic writing), his years as a preacher, and, perhaps, his unique use of color and perspective, Dr. Bear says.

Neurologists emphasize that there are many different components to the artistic act: manual skill, perception, spatial manipulation, recall of emotion.

"Each artist has a personal tool kit of skills that allows his art to be stamped with his own individual creativity," says Daniel Hier, the neurologist at the Michael Reese Medical Center.

While science can tell us how the parts fit together and what happens when some fail to work, the ultimate reasons why some people, and not others, become artists is likely to remain beyond its reach.

Researchers Link Manic-Depressive Illness and Creativity

Continued from Page A4

of poets, 38 per cent of artists, and 50 per cent of playwrights had been treated for major depression, compared to 5 per cent of the general population.

Ms. Jamison has also delved into the biographies and mental health of artists of the 18th, 19th, and early 20th centuries. As far as she knows, there have not been any formal studies to pin down the rate of suicide among artists. Nevertheless, she says, "it's a striking phenomenon."

"All you have to do is go down a list of poets, writers, and other artists" and you will find a history of institutionalization and suicides, Ms. Jamison said.

"The 19th century could easily be called the manic-depressive century, because it's filled with people who were institutionalized for severe mood disorders," she added. Notable examples in this century would include the American poets Anne Sexton and Sylvia Plath, who both committed suicide following relatively brief, almost explosive periods of productivity.

Writers Studied

Ms. Jamison's findings parallel a study of writers that was widely reported in 1987. That study, conducted by Nancy Andreasen, professor of psychiatry at the University of Iowa College of Medicine in Iowa City, looked for any clinical symptoms of a mood disorder (anxiety, depression, or mania, for example) in writers who had attended the well-known Iowa Writers Workshop. Since manic depression is believed to have a genetic basis, Dr. Andreasen also interviewed close relatives of the writers. She found that 43 per cent of the writers and 15 per cent of their relatives had had symptoms of manic depression.

When Dr. Andreasen embarked on her research years ago, she was inter-

ested in schizophrenia. For many years, "schizophrenia" was a poorly defined term encompassing a variety of specific mental illnesses. Some psychiatrists thought that schizophrenia was prone to what was called "overinclusive thinking": making associations between remotely connected thoughts, overgeneralizing and overabstracting. Somehow, it was thought, schizophrenic traits like those could produce artistic creativity.

Dr. Andreasen did not find any evidence for schizophrenia or mental illnesses other than mania and depression among writers.

If manic depression or less severe mood swings are in fact vastly more common among artists than among people in general, the question is, "Why?"

'Disruption and Re-Integration'

At a session on the creative mind at the annual American Psychiatric Association meeting in San Francisco in May, panelists argued that at the heart of artistic expression lies the process of change: changes in mood, in perception, in energy levels. "The creative process involves a cycle of disruption and re-integration in response to stress," said Frederic F. Flach, adjunct associate professor of psychiatry at Cornell University Medical College in New York City. If it is true that that cycle occurs in all of us, as Dr. Flach argued at the meeting, it is also true that some people—artists—undergo it more frequently. In some of them, the process of re-integration after disruption fails. "Mental illness," suggested Dr. Flach, "is a failure in the regulation of this process."

Ms. Jamison says there is "a wide range of reasons" why manic-depressive illness might be so closely tied to artistic production. It is well known among psychiatrists that when people with this disorder ap-

proach the manic state, what psychiatrists call "hypomania," they experience great increases in their energy level, their willingness to take risks, their emotional intensity, and the fluidity with which they can make associations between disparate ideas. Those are the same things that many think are intrinsic to the process of creating a work of art.

Many artists apparently sense this connection. Believing that the source of their cycles of euphoria and despair is the same wellspring from which their creativity emerges, they commonly refuse treatment or discontinue drug therapy.

The effect of lithium, the drug commonly used to treat manic depression, on artistic creativity is not clear-cut, Ms. Jamison says. Lithium does appear to lessen the rate at which a patient makes associations between ideas, and the fluidity of such associations, important aspects of the creative process. These cognitive effects are most noticeable at higher doses, and can be easily monitored through the use of daily diaries of mood, she says.

The one study to date of more than a handful of artists, reported several years ago by Mogens Schou, a psychiatrist then at the Aarhus University Institute of Psychiatry in Denmark, found that the majority of artists treated with lithium reported being as productive or even more productive while taking medication to stabilize their moods. However, a substantial minority—6 of the 24 cases reported—said that the lithium negatively affected their work.

"From the therapy point of view," says Ms. Jamison, "the ethical concern is how to maximize creativity, keep the person within a flow of moods that is comfortable, and yet minimize the pain. Manic depression is a lethal disease, and it should not be romanticized."

—CHRIS RAYMOND

Fellowships and Awards

Pew Charitable Trusts

NEW HAVEN, CONN. The Pew Charitable Trusts of Philadelphia have named 20 young researchers as Pew Scholars in the Biomedical Sciences.

The scholars' program will award each of the researchers a total of \$200,000 over four years.

Following is a list of the award recipients, their institutional affiliations, and their fields of research.

Michael P. Bevilacqua, Brigham and Women's Hospital (Boston): vascular pathobiology.
 Pamela J. Bjorkman, California Institute of Technology: immunology.
 Anthony M. C. Brown, Cornell U. Medical College: molecular biology.
 Nancy Curves, Albert Einstein College of Medicine of Yeshiva U.: membrane-associated transport proteins.
 Gregory A. Clark, Princeton U.: microbiology.

Patricia Corbin, New York U. Medical Center: cellular adhesion.

Douglas W. Duffin, U. of Virginia: developmental biology.

Mark E. Johnson, U. of Minnesota: immunology.

Daniel D. Kahler, Columbia U.: genetics, molecular biology, and biochemistry.

Bruce D. Kahner, Duke U.: cell biology.

J. Michael Kinsley, U. of Michigan Medical School: microbial pathogenesis.

John Kariyan, Rockefeller U.: protein crystallography.

Richard S. Lemons, U. of Utah: molecular genetics and biology of cancer.

Mark B. Lashin, Emory U. School of Medicine: developmental neurobiology.

Bruce E. McConnell, Stanford U.: developmental neurobiology.

Virginia L. Miller, U. of California at Los Angeles: molecular basis of bacterial pathogenesis.

M. Blaise Omer, U. of California at San Diego: cell biology.

Flaviano S. Pavesi, Massachusetts Institute of Technology: developmental genetics and neurobiology.

John B. Thomas, Salt Institute for Biological Studies: molecular neurobiology.

Wesley C. Van Veen, U. of Washington: immunology and molecular parasitology.

well explain some of van Gogh's bouts with hallucinations as well as his attempts to eat his paints, says Mr. Arnold. Many paints and varnishes contain chemicals closely related to thujone.

"My working hypothesis is that hallucinations might possibly have given van Gogh a different perception of color and relationships between objects," says Mr. Arnold. "You can see some of that in his choice of palette in his final period," he adds, as well as use of "interesting and unusual perspective."

Mr. Arnold acknowledges that the change in venue to the south of France may also have influenced van Gogh's shift to brighter, more intense colors.

Ravages of Alcohol Abuse

Jackson Pollock's abstract expressionism, particularly his "automatic" technique of dripping paint on the canvas, meanwhile, may have been influenced in part by the neurological ravages of alcohol, according to Antonio R. Damasio.

Dr. Damasio, head of the department of neurology at the University of Iowa College of Medicine in Iowa City, has studied Pollock's work from the perspective of cognitive science. Pollock was hospitalized several times for alcohol abuse, and even received electroshock treatment.

Dr. Damasio points to two ways in which chronic alcohol use can affect the brain. One is to "alter the balance of psychological processes," he says, increasing the flow of imagination but also clouding clarity. The second is directly to destroy nerve cells in key parts of the brain involved in memory, cognition, and movement, including the cerebral cortex, the thalamus, and the hippocampus.

What intrigues Dr. Damasio is that the goal of Pollock's technique of automaticity—in which he tried to establish a direct connection between the canvas and the unreasoned impulses of his unconscious mind—may have been abetted by, or at least congruent with, the neurological effects of alcohol abuse. By letting go of conscious control, Pollock opened the way for the more primitive rhythms of lower brain activity that normally do not express themselves except during sexual passions, dreams, or mind states induced by brain disease that damages part of the cerebral cortex, Dr. Damasio has argued.

Effects of Stroke

While alcohol works slowly, stroke moves swiftly. Throughout the 1950's and 60's, Reynold Brown's chaotic and highly detailed images graced the posters for hundreds of Hollywood movies, from *Dr. Zhivago* to *The Incredible Shrinking Man*. In 1976, Mr. Brown had a stroke that affected the parietal lobe in the right hemisphere of his brain, leaving his left side paralyzed. At age 56, he was forced to become exclusively right handed, and had to try to regain the fine motor skills that had helped him to reach the pinnacle as a poster illustrator.

Mr. Brown's early work following his stroke also showed one of the classic signs of damage to the right hemisphere of his brain, which translated in his posters to large blank spaces on the left side of the canvas.

"With a right-side lesion, there is incredible neglect of the left side of space," says Elliott D. Ross, associate professor of neurology and psychiatry at the University of Texas Health Sciences Center. "People

Continued on Following Page

RESEARCH NOTES



Ink rubbing shows the inside (right) and outside of an ancient Chinese tortoise shell used by scientists to gauge the speed of Earth's rotation.

Astronomers Say Ancient Clue Shows Earth's Spin Has Slowed

A team of astronomers has determined how much Earth's rotation has slowed down during the past 3,200 years by using an unusual source of information—an ancient oracle bone once believed in China to be able to foretell day-to-day events.

From the inscription on the oracle bone—actually, a piece of tortoise shell used by seers during China's Shang Dynasty in the 14th century B.C.—the astronomers fixed the date and path of a solar eclipse seen in China in 1302 B.C.

That, in turn, helped them to determine that the length of each day was forty-seven one thousandths of a second shorter in 1302 B.C. than it is today.

The result, consistent with other studies of ancient eclipses, was reported last week at a meeting of the American Astronomical Society by Kevin D. Pang, an astronomer at the California Institute of Technology's Jet Propulsion Laboratory.

Working with Mr. Pang were Hung-hsiang Chou, a professor of East Asian Languages at the University of California at Los Angeles; Kevin Yau, a physicist at Durham University in England; John A. Bangert of the U.S. Naval Observatory; and Dharam V. Ahluwalia, a mathematician at the Jet Propulsion Laboratory.

The oracle bone was among 25,000 inscribed shells that were excavated from Anyang, the capital of the Shang Dynasty in ancient China, about 300 miles southwest of Beijing. On the bone, researchers found the inscription of a diviner's question about the 52nd day of the calendar system used in China and the events of that day in which, it states: "Three flames ate the sun and big stars were seen."

The astronomers concluded that only a total eclipse of the sun would allow stars to be seen during the day and make it appear that "flames," or coronal streamers, had eaten the sun.

Using a computer model of Earth's rotation, the astronomers then determined how fast Earth must have been spinning for such an eclipse to be seen from Anyang on that day. If Earth's rotation were faster or slower, Mr. Pang explained, the eclipse path would have been moved to the east or west and would not have been observed in Anyang.

Mr. Pang said the study should also be useful to historians because it sets an exact date for the reign of King Wu

Ding, the ruler for whom the oracle bone was prepared.

—KIM A. McDONALD

Astronomers Find Evidence of Unusual 'Brown Dwarfs'

Astronomers last week reported that they might have discovered a number of sub-stellar objects known as brown dwarfs, with properties that suggest that such objects may be more ubiquitous in the universe than had been believed.

William J. Forrest, a professor of physics and astronomy at the University of Rochester, announced the findings at a meeting of the American Astronomical Society at the University of Michigan at Ann Arbor. He said he and his colleagues at Rochester, the University of Massachusetts at Amherst, and the University of Hawaii had found nine objects, which they believe to be brown dwarfs, in a part of the Taurus constellation that is located 450 light-years from Earth.

Brown dwarfs are believed by astronomers to be the smallest star-like forms created from interstellar clouds of gas. Although no such object has conclusively been identified as a brown dwarf,

scientists believe they range from a few times to 80 times the mass of Jupiter.

Because brown dwarfs are also thought to evolve quickly, losing their brightness rapidly, they are believed to be extremely difficult to detect.

Using the National Aeronautics and Space Administration's Infrared Telescope Facility on Mauna Kea, Hawaii, Mr. Forrest and his colleagues pointed an infrared camera toward a section of the Taurus constellation known to contain very young stars with the hope of finding young, bright brown dwarfs.

What they found were nine objects fitting the description of a brown dwarf, but with relatively low masses, ranging from 5 to 20 times the mass of Jupiter.

Since most searches for brown dwarfs have focused on those that are more massive and, thus, more luminous, Mr. Forrest said he suspected that much of the universe might contain lower-mass brown dwarfs that as yet have been undetected.

—K. A. M.

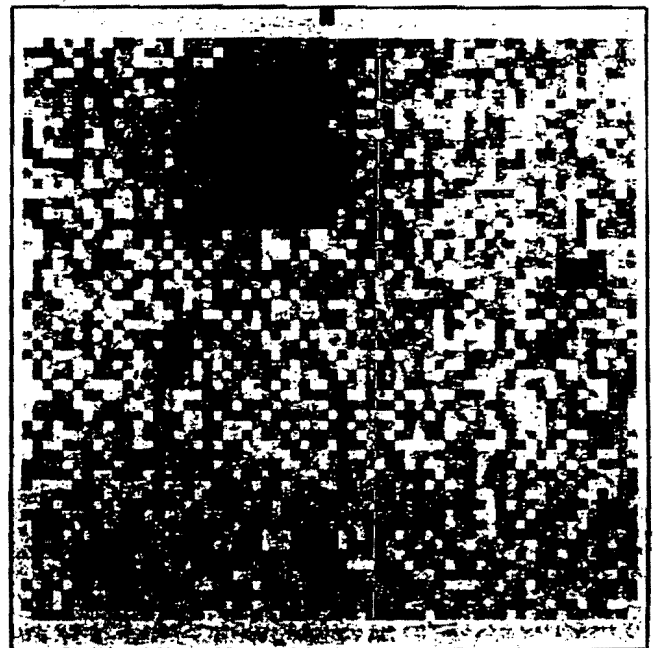
Attitudes Toward Author's Life Can Assist 'Canonization'

The symbolic importance that later devotees attached to Henry David Thoreau's retreat to Walden Pond may have as much to do with his place in the literary canon as does the assessment of his written works, says a literature scholar at Oberlin College.

In the May issue of *American Literature*, Lawrence Buell argued that the "canonization" of a literary work can be assisted by rituals and attitudes that build up around the writer and the places associated with his or her life.

In 1854, Thoreau published what is now considered his masterpiece, *Walden, or, Life in the Woods*. In the century and more since then, Mr. Buell said, Walden Pond has become a place of pilgrimage. Thoreau has come to be regarded as a kind of saint, and his so-

Continued on Page A7



Photograph taken with an infrared camera shows a star (large dark object at top) and two nearby brown dwarfs observed in the Taurus constellation.

Tempo

Chicago Tribune

Wednesday, May 4, 1988



An artist with epilepsy depicts what she sees during a seizure.

Meeting of minds

Science and art explore the
biological basis of creativity

By Peter Gorner

Catastrophe in the brain—a tumor, a seizure, a stroke—may erase the power of speech, of movement, of mind. Cataclysm in the brain of a visual artist may annihilate artistry.

Yet from human suffering knowledge sometimes comes, about the nature of the brain, and of the artist.

Such thinking pervades "Art and the Brain," a pioneering national conference exploring the biological basis of creativity, to be held May 12-14 at the Art Institute of Chicago.

Which brain systems support creativity? How is art defined and evaluated? How is artwork changed by brain disease? Are the brains of artists different from those of writers, musicians, mathematicians, politicians, athletes? New findings in the brain sciences have led experts to believe that inborn talents are based on specific neural pathways molded through nature and nurture.

"Neurologists today believe that people differ by the way their brains are organized and how they function," says Dr. Daniel Hier, chief of neurology at Michael Reese Hospital and Medical Center, a sponsor of the symposium, with the School of the Art Institute.

"The idea of different brains is touchy," Hier emphasizes. "It goes directly against one of the fondest notions in our culture: that anyone can do, or be, anything he wants, so long as he is willing to work hard enough.

"Certainly, education makes a difference, as do personality, upbringing and luck. But it seems obvious to me that people possess inherited abilities that are independent of everything else.

"The question becomes: What is the neurological basis of inborn talent? Is it a matter of how the brain cells and systems are connected and the ways they interact? If so, we now have the scientific ability to look at such things."

The latest research from a wide range of disciplines will be presented at the conference by nearly two dozen leading specialists in the neurosciences: art history, therapy and education; psychiatry and developmental psychology; cultural anthropology; and speech pathology and learning disabilities.

Guest lecturers include Harvard psychologist Howard Gardner, noted for many educational theories, including the controversial idea that people possess several kinds of intelligence that are unmeasurable by standard IQ tests; psychiatrist Nancy Andreasen, of the University of Iowa, who has documented the surprisingly high rate of manic-depression among writers; and California art educator Betty Edwards, author of "Drawing on the Right Side of the Brain."

Sixty drawings and paintings by 13

brain-damaged artists (works created before and after their illnesses) will be on display. Ironically, it is the extraordinary drawing talent of visual artists that makes them so interesting to brain scientists. A normal, healthy artist displays fluency in too many areas for scientists to isolate and study specific abilities. But when something goes awry in an artist's brain, the damage shows up much more clearly than in artwork by the untutored and untalented.

The brain's wiring is, in effect, parallel, like sets of Christmas tree lights, Hier explains. "You can remove one light, and others still function. If brain damage occurs when you have a tumor or a stroke, one strand of wires has broken. The rest of your brain still works. One system is affected, usually, and that gives us insights into what the system really does."

Talent in visual art is believed to stem from the right side of the brain, as has been intriguingly demonstrated by a suburban Chicago woman whose recovery from a stroke inspired the "Art and the Brain" conference.

Fourteen years ago, Carol Frankel was a carefree 20-year-old college student hoping to become a schoolteacher. Then she suffered a stroke in her left, or dominant, cerebral hemisphere.

The hemorrhage paralyzed the right side of her body. She also lost the ability to speak—Broca's aphasia, this is called, for the 19th Century French anthropologist and pioneering surgeon, Paul Broca, whose studies of live patients and dead brains led him to believe he had localized the brain area responsible for speech and language ability.

Broca was quite precise about the turf he staked out—the posterior portion of the third convolution of the frontal lobe of the left cerebral hemisphere in a right-handed person. Damage this area, he said, and you lose language.

Frankel worked tirelessly with her therapists—speech, occupational, physical—to try to regain what she had lost. Because she could no longer speak, her mother suggested she take art lessons. Perhaps painting could provide her with a means by which to express her feelings.

Whereupon something remarkable occurred.

A neophyte artist, a right-hander forced to hold the brush in her left hand, Frankel began to paint landscapes, and they weren't bad. They were so good, in fact, that Andrea Gellin Shindler, Frankel's speech therapist at Reese, grew fascinated.

"Her oils looked incredible to me," says Shindler, now a research associate in neurology at the hospital. "Carol had shown no aptitude for painting before the stroke. Yet I couldn't do with my right hand what she was doing with her left.

"Over the years, she has become a completely functioning woman again, although she continues to have significant difficulties in speech and mobility."

Frankel's newfound form of expression gave credence to the theory that the left side of the brain is dominant in most people; that it is the seat of language and the ability to symbolize; that it thinks verbally, searches for ways to lump and simplify and likes to organize thought in a linear fashion.

Normally, the left brain suppresses the right, which is believed to be more abstract, emotional and non-linear; enjoys seeking out complexities; and thinks in terms of images, not words.

Yet in some people, the right brain overcomes the dominance of the left and gives them a special talent for perception, especially for observing the relationships of objects in space.

The pop psychology simplification—the right-versus-left-brain theory—has tended to mask one of the great enigmas of brain science. Visual-motor skills are crucial to visual artists and are either innately superior in them or highly developed. But do artists excel because of an unusual brain? Or have their brains become unusual as they have excelled? The classic nature-nurture clash continues to spark debates over creativity, even as scientists refine their skills at spotting areas relevant to talents and abilities in human brains.

When an individual (artist or nonartist) suffers damage to the left hemisphere, his art becomes more simplified and childlike, yet the overall contour is retained. Right-hemisphere damage, however, often leaves the artist with the ability to render details but unable to organize them into a single composition, only into fragmented or irregular contours. The organization of space becomes disoriented.

Yet far more than the right brain is involved in the making of an artist. Most parts of our brains are interacting at every instant.

"If you're an artist," Hier says, "you need the limbic system, which is involved in memory and affect [emotion]. The frontal lobes provide motivation—in order to create, you must be motivated to do so. The reticular system in the brain stem keeps you alert. The motor cortex allows you to draw; the premotor cortex and superior parietal lobe store the skill programs that let you control the movements when you draw or paint. The visual cortex lets you see, and the visual association cortex processes what you see.

"You need the frontal parts of the brain [on both sides] that are involved in creating, supervising, planning and innovating. We also think that the language area on the left side contributes by allowing you to symbolize. And there is a network on both sides that is involved in directed attention—it allows you to explore both sides of space and utilize them."

Nonetheless, the art of Reynold Brown, which will be displayed at the conference, demonstrates how crucial the right brain is to an artist.

Brown, 69, spent much of his career as the premier poster illustrator in Hollywood, renowned for "powerhouse, impossibly chaotic images of panic and mayhem rendered with incredible detail," in the words of a fan magazine. His work enlivened more than 250 movie campaigns—"The Creature from the Black Lagoon," "The Incredible Shrinking Man," "Cat on a Hot Tin Roof," "Spartacus," "Dr. Zhivago"—the list seems endless.

When Brown suffered a stroke on the right side of his brain, his left side was totally paralyzed. Left-handed, he had to teach himself to draw with his right hand. Because his brain could not process space to his left, his paintings had gaping holes of blank space on that side. Such "neglect" is not uncommon to a stroke victim, who may comb only one side of his hair or shave only one side of his face.

Brown eventually learned to cue himself to fill in the left side of his drawings. Over 10 years, he re-

gained part of his skill, though his work became much more abstract and lost detail, leaving him frustrated and unfulfilled.

However, a disastrous dementia, such as severe Alzheimer's disease, causes most brain functions to break down.

In a rare instance, researchers have been able to chart the dramatic decline of intelligence in an artist over several years. It is chilling.

At age 67, the man's personality changed. His memory began to fail, and he became irritable, stubborn and suspicious. A diagnosis of Alzheimer's followed. For the next three years, however, his artwork still demonstrated considerable skill in shading, coloration, depiction, perspective, proportion and balance.

By age 74, however—seven years after onset—the deterioration of a dying brain was clearly evident in the Alzheimer's patient. The motivational, organizational and executive levels of functioning were wiped out first, followed gradually by the visual-spatial abilities. His art reveals a loss of detail, absence of perspective and simplification of color choice. He no longer painted with oils and refused to try. He was unable to vary his themes and produced only copied versions of his previous paintings.

His art lost its representational style. It became "impressionistic"—a term of art, not science—featuring simpler themes executed in far less literal fashion. The whole feeling is looser, freer-flowing, more abstract.

This style nonetheless has been universally preferred by art experts who have examined the Alzheimer's patient's output. The phenomenon is not new. Vincent Van Gogh's so-called "Asylum paintings," done while confined as a psychotic in southern France, are often considered to be his boldest, most emotional and visionary works.

"In the case of the Alzheimer patient," neurologist Hier notes, "science says this man is clearly going downhill, yet art experts say his work is much more interesting. How does that relate to an outstanding artist?"

"It reflects, I think, our respect for things that are novel and innovative. Critics rarely prefer a craftsmanlike job.

"Brain damage can indeed make you see things differently. If a healthy artist sets out to do something different, he may through inspiration and experience create great art. But painting of higher quality also may occur by accident, through the disruption of normal systems.

"This is not through conscious will or through efforts of the frontal lobes [areas of higher learning] of the brain. The Alzheimer patient was trying to draw the same way he had before. His system couldn't do it. He failed. Yet the result is esthetically pleasing."

The evaluation of creativity is a key feature of the work of Harvard's Howard Gardner, who will address the Chicago conference at 9:30 a.m. on May 12. About 500 people are expected to attend the symposium, including artists, physicians, educators, students and the public. (Information may be obtained by calling Andrea Shindler at 791-4481).

Gardner recognizes seven distinct talents, or forms of intelligence, that people have. He is harshly critical of IQ tests because they measure only one or two of them.

Some people, Gardner says, are innately linguistic, with discriminating language skills and sensitivity to the subtle meanings of words. Others are logical-mathematical, abilities that have long been measured on IQ tests. Inborn musical intelligence shows up early and is expressive, like linguistic talent. Painters and sculptors possess spatial intelligence and can re-create forms in space that nonartists are unable to detect. Athletes have bodily kinesthetic intelligence, Gardner says.

Politicians, especially, demonstrate what Gardner calls interpersonal intelligence. They instinctively react to the subtle moods and intentions of others. Finally, Gardner says, people can possess intrapersonal talent. Those who do know and understand themselves very well and are able to capitalize on their strengths and avoid their weaknesses.

"Freud and Picasso afford us two very different examples of creativity," Gardner says. "Freud combined linguistic, logical and intrapersonal intelligence. His creative contribution came because he was able to blend them together.

"Picasso had spatial, bodily kinesthetic and more interpersonal—a greater understanding of the wants and needs of others.

"I would argue that creative individuals differ from one another, but in terms of personality and motivation, they may be quite similar.

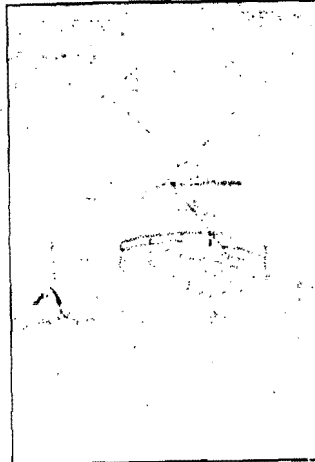
"Both Freud and Picasso were extremely ambitious, self-confident, hard-working and able to ignore criticism. They both used other people and cast them aside when they were done with them. Suicides may be attributed to both Picasso and Freud."



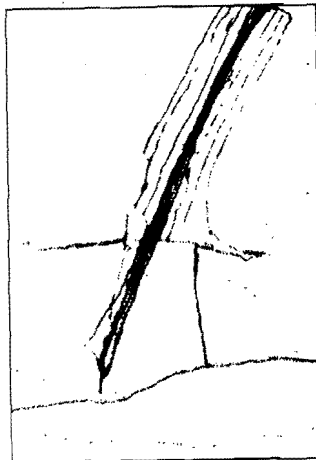
The deterioration of an artist with Alzheimer's disease. At onset.



'85—Critics hailed this attempt though the disease was progressing.



'86—8 years past onset.



'87—decline continues.

Creative people, Gardner says, must work in a "domain" that is accepted by society as worthwhile. "It's an argument against the idea that people are generally creative. Picasso was creative in painting. Freud drifted from one domain to the next—philosophy, medicine, neurology, anatomy, psychiatry—and never really fit in. So he created his own domain—psychoanalysis."

Creativity abhors a vacuum, Gardner says. "In an area like painting, what I call the 'field' is tremendously important. Gallery owners, critics, consumers all decide whether you'll be noticed or not. In any field, there are individuals who are doing their own things; they're working and a few of them get picked out as being meritorious. Very few of these end up redefining what the domain is. So painting is different after Picasso, psychology is different after Freud, physics is different after Einstein."

The next generation of young talents will master a different

domain, one that has been affected by the work of the creative individuals. Thus to understand creativity, one must look at the interactions among talent, structures of knowledge, and the judges, or institutions, Gardner says.

In a creative individual, various talents mesh in a manner that Gardner calls "a fruitful disharmony."

"If the creative tension inside the individual, and between the individual and his domain, isn't too great, the artist may create something worthwhile. When Freud couldn't connect with the domain that existed, he created his own. Picasso's domain was given to him by his father, a painter. But Picasso's set of intelligences were unusual. He didn't do well in scholastic studies, so he moved to the graphic. He became the best artist in Spain, whereupon he moved to France and became somewhat estranged.

"I believe you could apply this theory of fruitful disharmony with any creative individual. The trouble is, the theory is too easily proved correct, and I don't think we understand it yet. Did these people have a need to deal with disharmony, or was the disharmony something that came about because they had a greater understanding of themselves?"

The theory, however, separates truly creative people from those who are merely gifted or talented, Gardner says.

"Freud was always uncomfortable when people were too accepting," he says. "Freud always was raising the ante. He once toured the United States with Carl Jung. Freud didn't like this country and quickly went back to Austria, but Jung was lionized and had a wonderful time here.

"He sent a telegram to Freud: 'Wonderful news. Psychoanalysis is great success in America.'

"Freud, though, wired back: 'What did you leave out?'"

Picasso was always changing his style as well. "He never wanted to be happy by doing the same old thing."

Gardner calls the Chicago conference "the beginning of a conversation between two thriving disciplines—the arts and sciences—that haven't talked much to each other before.

"The two areas, though, are on the final frontier.

"In the sciences, we might say that the discoveries of physics and biologists into the nature of life have turned the crucial corner in this century. Exploration of the mind is the last frontier.

"And I think we'll know a lot more about how the mind works after this conference than we did before."

Media / SPORTS, DANCE, MOVEMENT & THE BRAIN



THE FOUNDATION FOR HUMAN POTENTIAL

She's *how* old?

Daily Herald

Wednesday, April 19, 1995

She's 85, an avid runner and a good example of that mysterious connection between mind and movement



Anne Clarke takes a fitness class at Windsor Park Manor in Carol Stream.

By TOM VALEO
Daily Herald Staff Writer

Twenty years ago, when Anne Clarke retired at the age of 65, she decided to spend some of her new-found free time on exercise — an activity she had neglected all her life.

"My mother thought little girls should just sit in a chair and rock their dolls," she said.

She signed up for an exercise course at the Ryall YMCA in Glen Ellyn, and dutifully went through the motions, but when the instructor told the class to go outside and run, Clarke balked.

"I definitely did not want to run," she said. "When I didn't show up for the next class, the instructor came to my house on her motorcycle and took me to the Y. I decided if she cared enough about me to do that, I would stick with it."

Clarke decided to buy a good pair of shoes and give running a try. She would go out early in the morning so no one would see her jog, and it was a year-and-a-half before she could run a mile, but she kept at it because it was making her feel so much better. Her arthritis disappeared, and so did the bursitis in her shoulder. Her blood pressure, which had been slightly elevated, dropped back into the normal range, and she lost the few extra pounds she had been carrying.

But more than that, she felt much better mentally. "I was just a happier person," Clarke said.

By the time she was 69, she was running three miles a day, and she decided to enter the Bonne Bell 10K race in Chicago.

"I ran so hard I almost broke down," she said, "but I was so thrilled that I finished. We went out to dinner at a restaurant and I wore my number; I

SPOTLIGHT ON SDUPAGE

"I consider myself addicted to running, but I love my addiction." — Anne Clarke

was so proud of it."

The experience was so gratifying that Clarke began entering races every few weeks, and has completed more than 500, including eight marathons.

In one of those races — a 10-kilometer in Chicago — she passed Andrea Gellin Shindler, a woman half her age, who was startled to see a woman with white hair streaking toward the finish line. Shindler considered herself strictly a recreational runner who was not the least bit competitive, but when Clarke passed her she thought, "I can at least beat HER!"

But she couldn't.

"I really tried but I just couldn't catch her," Shindler recalls. "She was really moving."

Shindler never forgot that experience, and when the time came to assemble speakers for a symposium titled "Sports, Dance, Movement and the Brain," she invited Clarke to participate.

■ ■ ■

The symposium, which will be held this weekend at the Art Institute of Chicago, is the third that Shindler has organized. Her first, "Art and the Brain," in 1988, attracted artists, teachers, psychologists, neurologists

See **RUNNER** on Page 2

RUNNER: 85-year-old is an inspiration

Continued from Page 1

and many others from all over the nation.

One of the speakers was Howard Gardner, a cognitive scientist from Harvard who wrote "Frames of Mind: The Theory of Multiple Intelligences," published in 1983. In the book Gardner argues that intelligence isn't a single ability of the brain; rather, it is divided into at least seven distinct skills:

- Intrapersonal (how well we deal with ourselves).
- Interpersonal (how well we deal with others).
- Bodily/kinesthetic (how well we can move).
- Spacial (how well we sense the space around us).
- Logical/mathematical.
- Musical.
- Linguistic.

Shindler was so impressed with Gardner's thesis that she created the Foundation for Human Potential and decided to hold a symposium every few years, devoted to one of Gardner's seven types of intelligence.

The second, held in 1992, was titled "Music and the Brain," and the third, being held April 21-23, is devoted to movement, especially dance and athletics.

Shindler has assembled psychologists, neurologists, dancers, coaches — and an 85-year-old runner named Anne Clarke — for the purpose of exploring how the brain produces highly complex and controlled movement.

■ ■ ■

Anne Clarke is a good example of the mysterious connection between mind and movement. When Clarke first took up exercise, her mind pushed her body.

Her reason convinced her that running was a good thing for her health. Her will kept her focused on the task, and even her emotions played a part.

"Pride was a big part of my motivation," Clarke said. "I would feel so proud whenever I completed a race."

But after running for a while, this process started working in both directions, and her body started to rejuvenate her mind. "I

Anne Clarke to speak at seminar

Anne Clarke will speak at the "Sports, Dance, Movement and the Brain" symposium at 10:50 a.m. Saturday.

She will appear on a panel with two others: Bonnie Frankel, who, as a 49-year-old college student, ran on the track team; and Joseph Mazo, author of "Dance is a Contact Sport" and "Prime Movers: The Makers of Modern Dance."

The symposium also will feature nearly two dozen neurologists, physiologists, psychologists, dancers and others who will speak on the way the brain orchestrates complex movement.

The featured speaker is Antonio Damasio, a neurologist at the University of Iowa who, with his wife, Hannah Damasio, has used CAT scans to identify where and how the brain performs some of its most mysterious functions.

Damasio recently published a book titled "Descartes' Error: Emotion, Reason, and the Human Brain," in which he demonstrates that the body and the mind are intimately linked, even though we tend to experience consciousness as something separate and autonomous from our physical

existence.

Some of the presentations at the symposium will get rather technical. Michael Merzenich, for example, from the University of California at San Francisco, will discuss "Cortical Mechanisms Contributing to Skill Acquisition and to Practice-Induced Dysfunction."

But the speakers will try to be accessible to the layperson, says Andrea Gellin Shindler, who organized the symposium.

"Sports, Dance, Movement and the Brain" will be held in the Rubloff Auditorium of the Art Institute, on the east side of the building facing Columbus Drive at Monroe Street.

The full registration fee is \$225, but a reduced fee of \$135 is available to students, medical residents and senior citizens.

Registration begins at 7:45 a.m. on Friday with the welcoming address at 9 a.m. Sessions on Saturday are from 9 a.m. to 4:30 p.m., and on Sunday from 9 a.m. to 3 p.m.

For information, call Joanne Donda at the School of the Art Institute, (312) 345-3516. (Fax: (312) 541-8063.)

— Tom Valeo

could think better, learn better and remember better," Clarke said. "Things just seemed easier for me."

Just recently, this strong connection between her mind and her body was demonstrated to her in a less pleasant way.

Shortly after her husband died in January, Clarke fractured her foot. She wasn't running at the time; she was merely doing floor exercises at one of the classes she teaches.

"But I was so tense and I had so much on my mind," she said. "I wasn't relaxed, and I think that's what did it. I was under a lot of stress, and stress is the worst disease there is."

The injury didn't slow her down much, however.

While recuperating with a walking cast on her foot, she would do upper body exercises while sitting in the recliner in her apartment at

Windsor Park Manor in Carol Stream.

"I moved as much as I could, but it was an awful period," she said.

The day she had the cast removed, the doctor told her she could walk, but she should take it easy. She started walking immediately, "but I was careful; I listen to my body," she said.

What her body told her was that walking felt just fine, so she walked down to the dining hall that evening. "And it didn't hurt."

Clarke intends to keep running, "but I'm only going to do 5K races from now on," she promised. "I'm 85 after all, and I don't want to hurt myself. Besides, I'm not interested in times anymore. I'm just glad to be running. Sometimes when I'm out running, I'll think, 'how beautiful this is; how good I feel.' I consider myself addicted to running, but I love my addiction."

ANDREA GELLIN SHINDLER

PROFESSIONAL EXPERIENCE

MARCH, 1996-PRESENT RUSH MEDICAL COLLEGE
DEPARTMENT OF NEUROLOGICAL SCIENCES
CHICAGO, ILLINOIS

POSITION Visiting Instructor

OCTOBER 1990-PRESENT THE FOUNDATION FOR HUMAN POTENTIAL
CHICAGO, ILLINOIS

POSITION Executive Director and Founder

Director, Sports, Dance, Movement and the Brain: A Symposium (1995). PRESENTED BY: The Foundation for Human Potential and The School of the Art Institute of Chicago. SPONSORED BY: The EJLB Foundation, Continental Airlines, Hyatt Regency Chicago

Director, Music and the Brain: A Symposium (1992). PRESENTED BY: The Foundation for Human Potential, Chicago Symphony Orchestra and The School of the Art Institute of Chicago. SPONSORED BY: The National Institute of Mental Health, Stouffer Riviere Hotel, USAir

JANUARY-DECEMBER 1990 EPSTEIN FINE ARTS FUND

POSITION Development Consultant

JULY 1980-JULY 1988 MICHAEL REESE HOSPITAL
DEPARTMENT OF NEUROLOGY
CHICAGO, ILLINOIS

POSITION Research Associate/Speech-Language Pathologist

Clinical research: Cognitive effects of Alzheimer's Disease and Stroke.
Publications: (see attached)

Director, Art and the Brain: A Symposium and Art Exhibit (1988). PRESENTED BY: Michael Reese Hospital and The School of the Art Institute of Chicago. SPONSORED BY: Lewis Manilow, The Nalco Foundation, The Walgreen Benefit Fund.

SEPTEMBER 1977- OCTOBER 1979	NORTHWESTERN UNIVERSITY DENTAL SCHOOL CLEFT LIP AND PALATE INSTITUTE CHICAGO, ILLINOIS
	POSITION Clinic Coordinator Faculty Appointment: Instructor
MARCH 1978- March 1979	EVANSTON HOSPITAL DEPARTMENT OF SPEECH PATHOLOGY EVANSTON, ILLINOIS
	POSITION Speech Pathology Consultant
JANUARY-JUNE 1977	HARVARD MEDICAL SCHOOL BEHAVIORAL NEUROLOGY UNIT BETH ISRAEL HOSPITAL BOSTON, MASSACHUSETTS
	POSITION Coordinator of Speech Pathology Services
JANUARY 1975- DECEMBER 1976	REHABILITATION INSTITUTE OF CHICAGO DEPARTMENT OF SPEECH PATHOLOGY CHICAGO, ILLINOIS
1975-Present	Licensed Speech and Language Pathologist

CIVIC INVOLVEMENT

1996-Present	NEW TRIER TOWNSHIP HIGH SCHOOL BOARD CAUCUS <u>Member from Wilmette District 39</u> WINNETKA, ILLINOIS
1996-Present	COMMUNITY REVIEW COMMITTEE <u>Member</u> Wilmette Public Schools District 39 WILMETTE, ILLINOIS
1995-1996	UNIVERSITY OF ILLINOIS at URBANA-CHAMPAIGN Division of Rehabilitation Education Services <u>Member of Advisory Board</u>
1993-Present	ILLINOIS MATH AND SCIENCE ACADEMY AURORA, ILLINOIS <u>Mentor to students</u>

1986-1995

FRANCIS W. PARKER SCHOOL

CHICAGO, ILLINOIS

Education Council (1994-95)

Co-Chair/Treasurer, AFS Program (1989-90)

Development Committee (1990-91)

Co-Chair, Auction Subcommittee (1986)

1990-1995

URBAN GATEWAYS

CHICAGO, ILLINOIS

Member, Board of Directors, (1994-1995)

Member, Benefit Committee, (1990-1995)

Co-Chair, Entertainment Committee

Jazz with Pizazz Benefit (1990-91)

1984-1990

THE MARY MEYER SCHOOL

CHICAGO, ILLINOIS

President, Board of Directors (1987-90)

Treasurer, Board of Directors (1984-87)

1986

THE SCHOOL OF THE ART INSTITUTE OF CHICAGO

CHICAGO, ILLINOIS

Beaux Art Committee: Annual fundraising event

EDUCATION

NORTHWESTERN UNIVERSITY

EVANSTON, ILLINOIS

M.A. Speech Pathology

December 1974

ADELPHI UNIVERSITY

GARDEN CITY, NEW YORK

B.A. Speech and Hearing Rehabilitation

June 1973

HONORS

REHABILITATION INSTITUTE OF CHICAGO

CHICAGO, ILLINOIS

Arrington Fellowship for Aphasia

Rehabilitation (1974)

ADELPHI UNIVERSITY

GARDEN CITY, NEW YORK

Cum Laude

Dean's List

Delta Tau Alpha Honor Society

LECTURING

Worthington-Kilbourne High School, Worthington, Ohio, Lyceum Program, Contemplating Creativity, October, 1996

Worthington-Kilbourne High School, Worthington, Ohio, Bridges to the Future Program: Varieties of Excellence: A Multiple Intelligences Approach, August, 1996

Wilmette Public Schools District 39 - Address to Principals and Superintendent, Wilmette, Illinois, A Summary of the Three International Symposia: Art and the Brain; Music and the Brain; and Sports, Dance, Movement and the Brain: Implications for Education, April 1996

Rush, Presbyterian - St. Luke's Medical Center, Department of Neurological Sciences, Chicago, Illinois. A Summary of the Three International Symposia: Art and the Brain; Music and the Brain; and Dance, Sports, Movement and the Brain, November, 1995.

Sports, Dance, Movement and the Brain Symposium, The Art Institute of Chicago, Chicago, Illinois. INTRODUCTORY LECTURE: Evolution of the Symposium, April, 1995

The Board of Trustees of The Francis W. Parker School, Chicago, Illinois. INVITED ADDRESS: A Case for Maintaining the Education Council of the Francis W. Parker School, September, 1994.

Music and the Brain Symposium, The Art Institute of Chicago, Chicago, Illinois. INTRODUCTORY LECTURE: Evolution of the Symposium, November, 1992.

The Brain Research Foundation of The University of Chicago, INVITED ADDRESS: A Summary of the Work of The Foundation for Human Potential, September, 1992.

Chicago Autism Society, Chicago, Illinois, The Use of the Arts in Autism, September, 1992.

Art and the Brain Symposium, The Art Institute of Chicago, Chicago, Illinois. INTRODUCTORY LECTURE: Evolution of the Symposium, May, 1988.

Alzheimer's Disease and Related Disorders Association, Chicago, Illinois. Neuropsychologic Testing for Alzheimer's Disease, May, 1983.

American Academy of Neurology, San Diego, California. Intrusions and Perseverations, May, 1982.

Northwestern University Dental School, Chicago, Illinois, Lecturing to dental students: Speech Disorders Associated with Cleft Lip and Palate, 1977-79.

Harvard Medical School: Beth Israel Hospital, Department of Neurology, Boston, Massachusetts. In-service lecturing to residents and nursing staff: The Neurology of Speech and Language, 1977.

American Speech-Language Hearing Association, Washington DC. A Case of Traumatic Aphonia Secondary to CNS Damage, 1975.

PUBLICATIONS

Shindler, AG Contemplating Creativity. Manuscript invited by the 1997 Encyclopaedia Britannica Medical and Health Annual. Publ. by Encyclopaedia Britannica, Inc.

Shindler, AG Schools should foster a love of learning. Letter to the Editor, Wilmette Life: Pioneer Press, April 18, 1996

Shindler AG et al (Eds) Sports, Dance, Movement and the Brain: Symposium Proceedings (in process)

Shindler AG et al (Eds) Music and the Brain: Symposium Proceedings (in process)

Shindler AG et al (Eds) Art and the Brain: Symposium Proceedings (in process)

Hier DB, Gorelick PB, Shindler AG Topics in Behavioral Neurology and Neuropsychology: with Key References. Butterworths Publishers, Boston, 1987

Hier, DB, Hagenlocker K, Shindler AG Language disintegration in dementia: effects of etiology and severity. Brain and Language 25:117-133, 1985

Gewirth LR, Shindler AG, Hier DB Altered patterns of word association in dementia and aphasia. Brain and Language 23: 307-317, 1984

Shindler AG, Caplan LR, Hier DB Intrusions and Perseverations. Brain and Language 23: 148-158, 1984

Shindler AG, Hier DB Book Review: Acquired Neurogenic Disorders (Marquardt TP, Author) Applied Psycholinguistics 4:1, 99-101, 1983

Hier DB, Thomas C, Shindler AG A case of subcortical dementia due to sarcoidosis of the hypothalamus and fornices. Brain and Cognition 2: 189-198, 1983

MEDIA COVERAGE OBTAINED

1996 Wilmette Life/Pioneer Press - Wilmette Personality Profile

1995 **SPORTS, DANCE, MOVEMENT AND THE BRAIN: A SYMPOSIUM**

Associated Press

Daily Herald, Arlington Heights, Illinois

1997 Encyclopaedia Britannica Medical and Health Annual

US News and World Report

1992-93 **MUSIC AND THE BRAIN: A SYMPOSIUM**

Associated Press

The Boston Globe

CBS News Washington

Chicago Tribune

Daily Herald, Arlington Heights, Illinois

1997 Encyclopaedia Britannica Medical and Health Annual

The Reader, Chicago, Illinois

WBBM-AM Chicago

WBEZ-FM Chicago

Voice of America

1988 **ART AND THE BRAIN: A SYMPOSIUM AND ART EXHIBIT**

The Boston Globe

Cable Network News (CNN)

Chicago Tribune

Daily Herald, Arlington Heights, Illinois

1997 Encyclopaedia Britannica Medical and Health Annual

The Reader, Chicago, Illinois

WBEZ-FM

LETTERS OF RECOMMENDATION ARE AVAILABLE UPON REQUEST



The University of Chicago

DEPARTMENT OF PSYCHOLOGY

COMMITTEE ON BIOPSYCHOLOGY

5848 SOUTH UNIVERSITY AVENUE

CHICAGO • ILLINOIS 60637

(312) 702-8859

FAX: (312) 702-0886

December 8, 1994

Andrea Shindler

The Foundation for Human Potential

3240 N. Lakeshore Drive, #9B

Chicago, IL 60657

Dear Andi:

I am deeply honored to serve as a member of the Board of Trustees of *The Foundation for Human Potential*. Although C.P. Snow saw two cultures and no way to weave their threads into a single tapestry, your vision and your accomplishments in bringing together the world of science with that of the larger culture are doing just that. In my view, it is not only the realization of human potential that depends on the continuation of this process, but our survival as a species.

The conditions of natural life for other animals reflect their common understandings, by instinct or by learning, and the behaviors these govern. But the human world has become one in which the conditions of our daily lives are powerfully determined by mysteries of science that nearly none of us understands and in which scientific consciousness attends mainly to itself. The danger of public ignorance and scientific arrogance is especially critical in this era as human brains are beginning to decipher their own workings. In my own field of human neuropsychology, I have witnessed the selling of pseudoscience in popular books, weekend courses, the popular media, and in the school systems.

The conferences on **Art and the Brain** and **Music and the Brain** are the only ones that I have ever attended in which artists and scientists, teachers and students, physicians and patients, and the general public seriously listened to each other, taught each other, and learned from each other. This kind of interchange, in which different scientists challenge each other before a listening and learning audience and in which other scholars, educators, artists, and the public contribute their perspectives, is a brilliant beginning. Much more is needed. I believe that *The Foundation for Human Potential* has a major role to play in weaving together Snow's two cultures. You and the *Foundation* have moved us forward toward this unification.

Warm regards,

Jerre Levy, Ph.D.
Professor

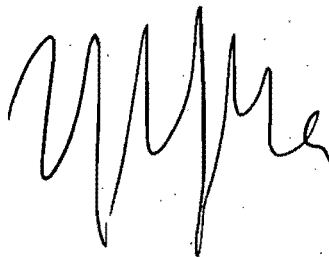
Statement by Yo-Yo Ma for the Foundation for Human Potential:

I have always been fascinated by the connection between the creative process and related neurological patterns which occur in human beings. Ultimately, underlying this fascination with the workings of the individual artist is a desire to understand why every society has had a need to produce art in one form or another, and how the production of that art form effects the human thought process.

As we make advances in neurological research and gain substantial scientific data on the relationship between the brain's relationship to artistic output, we will perhaps be one step closer to understanding some basic elements common to all mankind.

The Foundation for Human Potential supports studies of human creativity and the brain, and hosts symposia which allow further exploration of related topics. This year's symposium, entitled **Sports, Dance, Movement, and the Brain**, will provide the rare opportunity for scientists, artists, and educators to come together to explore common elements like time, space, motion, structure, and variety-- elements which are found in every discipline. The seeds of information exchanged at this kind of symposium will undoubtedly take root in new studies of the human brain and the arts, and reveal new approaches and perspectives on how human beings learn, function, and relate to one another.

I wish the Foundation for Human Potential every success in this worthwhile endeavor.

A handwritten signature in black ink, consisting of stylized, overlapping loops and lines, characteristic of Yo-Yo Ma's signature.

THE UNIVERSITY OF IOWA



DATE: November 8, 1995

RE: The Foundation for Human Potential

The Foundation for Human Potential has undertaken an ambitious program of dissemination of integrated knowledge in the fields of the sciences and the humanities. The Foundation's director, Andrea Gellin Shindler is to be credited with organizing several symposia in which experts from neurology, psychology, education, music, dance and the arts, and sports, came together in an effort to interrelate and make their activities more clearly understood to the lay public.

Without a doubt, the Foundation's efforts have touched many individuals in the Chicago area and elsewhere. I personally look forward to see it continue its activities especially if they will be focused on a badly needed educational effort in schools.

The Foundation for Human Potential deserves our attention, appreciation, and support.

Sincerely,

Antonio R. Damasio

Antonio R. Damasio, MD, PhD
M.W. Van Allen Professor and Head
Department of Neurology

ARD/nap

HARVARD UNIVERSITY
GRADUATE SCHOOL OF EDUCATION

THE DEVELOPMENT GROUP
HARVARD PROJECT ZERO
323 LONGFELLOW HALL, APPIAN WAY
CAMBRIDGE, MASSACHUSETTS 02138

(617) 495-4342
FAX (617) 495-9709
TELEX (1) 921 496

March 28, 1994

To Whom it May Concern:

I am pleased to endorse the request for funding for the ongoing activities of the Foundation for Human Potential, including "Sports, Dance, Movement and the Brain: A Symposium" planned for April 1995. I attended "Art and the Brain: A Symposium and Art Exhibit" in 1988 and consider it to be among the most important and memorable meetings that I have attended. Andi Shindler, the Executive Director and Founder of the Foundation for Human Potential, brought together an incomparable group of researchers from many disciplines, the educated public, and a remarkable set of artists who have continued to produce despite various kinds of impairments. Both the tone of the proceedings and the discussions and interchanges that took place following the papers were exemplary. It is no exaggeration to say that those in attendance have been marked by a bond; I know that I have had many opportunities to remain in contact, and to build upon, the relations forged at the meeting, with artists as well as with researchers. My discussions with colleagues and participants in "Music and the Brain: A Symposium" in November 1992 confirm that the latter Symposium had a similar impact on its attendees. Additionally, many of those who attended "Art and the Brain" returned for "Music and the Brain", expressing great interest in future symposia exploring the relationship between brain function and other abilities.

In undertaking a symposium on movement and the brain, Ms. Shindler takes on an important new challenge. While there have been a number of symposia on art and music held in the brain and behavioral sciences, there have to my knowledge been few if any comparable undertakings in the area of dance, sports, and other domains involving the skilled use of the body. Ms. Shindler has been in contact with many of the most important researchers in this area, as well as appropriate figures from the worlds of dance and athletics. This symposium promises to be a particularly important and fascinating one, which should prove of great moment for the fields involved.

Ms. Shindler has indicated that, in addition to the continuation of the series of symposia for a diverse audience and follow-up workshops for professionals, exploring the relationship between brain function, learning, and creativity, she is now in discussions with schools and school districts regarding the potential restructuring of curriculum, emphasizing the

importance of the appreciation of individual differences in learning styles. As the mission of the Foundation for Human Potential is to foster interdisciplinary research into brain-behavior relationships and to derive teaching methods from that research, the dual thrust of the Foundation for Human Potential fills a need to address these issues in a research context, as well as an educational one. I applaud and support these endeavors, because it is the important end result to be attained, the possible benefit to educators, children, and adults which distinguishes this enterprise from others.

Why is this work important? First, it is important to focus on and to try to understand the more positive aspects of human nature, of which artistic expression and bodily-kinesthetic expression, including dance, sports, and the movement of mime and acting, are outstanding instances.

Secondly, understanding of the brain is accumulating rapidly. However, most of those involved in brain study tend to be reductionistic and do not pay adequate attention to higher functions. To my way of thinking, any comprehensive theory of brain function needs to take into account human artistic capacity, including sports, dance and movement. These symposia can help to bring about a broadening of worldview among neuroscientists.

Third, damage to the brain continues to be one of the principal human afflictions. It is crucial to understand the effects of brain damage on artistic, musical, and kinesthetic capacities and, especially, to understand the important roles that the arts can assume in the treatment and rehabilitation of brain injury. Artistic and other forms of expression may assume an even more critical communicative role when other avenues are blocked or impaired.

Fourth, as an educator, I know that the arts are a crucial, indispensable part of human cognition and experience. During these times of budget cuts, the arts are almost always sacrificed, doing huge harm to existing programs and to the children who should benefit from them. As our understanding of the cognitive, affective, and social nature of the arts increases, we should be better able to justify their inclusion in the education of all civilized human beings and to bring that education about in the most informed way.

Ms. Shindler proposes to continue to study the brain-behavior relationships of learning and creativity through the means of these important symposia and to attempt to derive practical methods to teach, and to reach, children and adults, both neurologically impaired and normal, through educational means. Her goals are laudatory, her means, exemplary. Support of her efforts, in both the project and the ongoing work, could benefit children and adults in all cultures.

For all of these reasons, I hope that it will prove possible to secure the support the Foundation for Human Potential needs to continue this fine work.

I would be happy to supply additional information as requested.

Sincerely,



Howard Gardner

Professor of Education

Co-Director, Harvard Project Zero

Adjunct Professor of Neurology, Boston University School of Medicine

Ongoing Series Explores the Relationship Between Artistic Creativity and the Brain

In her early career as a speech therapist, Andrea Gellin Shindler discovered that after one of her patients, Carol Frankel, suffered a stroke, she developed unprecedented artistic abilities. "Carol's interest in painting was fascinating," Shindler recalls. "We discovered it during her rehabilitation therapy, and later I began talking about the case with other people in neurology and psychology. The more I learned, the more fascinating the subject became to me."

This discovery prompted Shindler to explore the relationship between neurological function and creativity, a subject that has fascinated both the medical world and the art world since Van Gogh. Shindler's questions brought her to the School's Department of Art Education and Art Therapy, which resulted in the first symposium devoted to the subject "Art and the Brain," held at the School in 1988.

The success of the symposium led to a second "Music and the Brain" in 1992, and to the recent "Sports, Dance, Movement and the Brain," held at the School this last April, which explored the relationship between movement (dance, sports, mime, and acting) and brain function. All three symposia have brought together scholars, educators, and artists from all over the world to stimulate interdisciplinary research and learning, from fields as diverse as neuroscience, education, art, speech pathology, developmental psychology, sports, and cultural anthropology.

Shindler's interest in the subject has resulted in the Foundation for Human Potential, a not-for-profit organization she formed in 1990 to explore issues concerning creativity and learning. The basis for Shindler's research and the symposia is the widely-acclaimed book *Frames of*

Mind: The Theory of Multiple Intelligences by Howard Gardner of the Harvard Graduate School of Education. Both Shindler and the School hope to continue this ongoing exploration in future symposia.

Unusual Marriage of Art and Commerce Unveiled at Chicago's United Center

Ameritech Cellular Services, one of the world's largest communications services, recently teamed up with the School in an unusual marriage of art and commerce at Chicago's new United Center. This state-of-the-art facility, which opened in September 1994, will host approximately 175 events each year, including the 1996 Democratic Convention. With an annual potential of attracting over 3-1/2 million visitors, Ameritech traded advertising space for original commissioned artwork reflecting the theme "The Art of Communication."

The company awarded commissions to eight artists/artist teams that included current students, recent alumni, faculty, and staff from the School. Winners were chosen from a pool of 76 proposals, and awarded commissions of \$1,500 to \$2,500.

According to Anne Marie Valencik, who coordinated the project for Ameritech, "the School has an excellent reputation for being on the cutting edge, and so does Ameritech." The content and media represented are as diverse as Ameritech's interests, and range from painting, sculpture, photography, neon, mixed-media installations, and computer-generated graphic images, which are displayed in the arena's three concourses.

"Bubble, bubble bubble." These words are the unique language of the whimsical creation envisioned by the "Bubbular Communications" team of Jeff Weisfeld, Florbela Silva, and Kitty Williams. In their winning work, two hand-crafted porcelain fish engage in an underwater conversation, generated by computer-controlled streams of bubbles, within a large aquarium. These artists explore the concept of wireless communication by creating analogies between bubbles under the sea and cellular communications in the air.

Other artists awarded commissions include Alaina Goetz, Michael Kingsbury, Debra Liptak, Ray Noesen, Natasha Rubel, Satre Stuelke, Nathaniel Sweeney, and Vello Virkhaus. Their works were unveiled on March 15, and will remain on display indefinitely.



Jeff Weisfeld, Florbela Silva, and Kitty Williams, detail of *Bubbular Communications*, mixed media, 1995.

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NEWSLETTER



Pictured at the Reception:
**ANDREA GELLIN
SHINDLER**, Executive
Director, *The Foundation for
Human Potential* and
MICHAEL C. SHINDLER,
President, *The Foundation for
Human Potential*, Vice
President, *Hyatt Development
Corporation*

Dear Friends,

I am delighted to report that Music and the Brain: A Symposium, the first project of *The Foundation for Human Potential* established in 1990, was an extraordinary success, particularly in this economy. The remarkable cooperation of our cultural in-kind sponsors, the **Chicago Symphony Orchestra** and **The School of the Art Institute of Chicago**, as well as the sponsorship of the **National Institute of Mental Health**, the **Stouffer Riviere Hotel** and **USAir** allowed us to bring an outstanding program to Chicago. Our international, interdisciplinary audience of nearly 400 attendees represented many fields including the neurosciences and music, as well as the educated general public. The interdisciplinary exchanges were fascinating and have resulted in new avenues for research on creativity and brain function. *The Foundation for Human Potential* will be planning workshops that focus on specific research ideas stimulated by this conference and the previous Art and Brain Symposium. The workshops will be structured to facilitate brainstorming among smaller groups of faculty and attendees.

We received international press coverage, having attracted among others, journalists from the Chicago Tribune, Daily Herald (IL), The Boston Globe, Time Magazine, the Journal of the American Medical Association, Associated Press, Encyclopaedia Britannica, Voice of America, as well as Chicago radio stations WBEZ-FM and WBBM-AM, and a journalist and film crew from CBS News in Washington D.C., taking footage for potential use on CBS Sunday Morning with Charles Kurault.

The symposium critiques, completed by nearly 200 participants, indicated outstanding reviews of the program, constructive criticism, suggestions for future conferences and interest in becoming involved with *The Foundation for Human Potential*.

The success of Music and the Brain: A Symposium attests to the promising future of *The Foundation for Human Potential*. We plan to add student advisors to our Board, in order to stimulate more ideas and involvement. The inquiries about *The Foundation's* activities and offers to help are extremely rewarding.

My goals for *The Foundation* have been to sponsor large interdisciplinary symposia to be followed by smaller workshops designed to study and pursue research ideas stimulated by the symposia. The overall purpose is to further research in the area of creativity and brain function and to utilize the information thereby derived, to develop teaching methods designed to stimulate creative and other idiosyncratic abilities, and ultimately, to maximize human potential. Your contributions to this end are gratefully appreciated.

Thank you so much for your interest and support. I hope to see you at our future programs.

With best regards,

Andrea Gellin Shindler

Executive Director and Founder

Comments From Attendees of Music And The Brain: A Symposium

Reasons For Attending... "Success of the first conference in 1988, Art and the Brain...My own love for this area of research and expertise...Description in the Chicago Tribune was very important...Knowledge of faculty...Opportunity for continuing enrichment..."

Symposium Strengths... "What a unique blend of musical and psychological creativity...The Foundation for Human Potential should be commended for providing such a wonderful opportunity for learning about the melding of music and brain research. It was an incredible collection of scholars, all of whom were obviously passionate about their work. I felt little of the usual sterility that frequently attends academic symposia in educational arenas. Thank you very much!...It was just as focussed and timely as Art

Continued on page 2

Symposium Brochures



THE FOUNDATION FOR HUMAN POTENTIAL

Art and the Brain

A Symposium and Art Exhibit
May 12-14, 1988



Joanne Donda
Department of Art Education and Art Therapy
The School of the Art Institute of Chicago
112 South Michigan Avenue
Chicago, Illinois 60603

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Organization
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Permit No. 2930

Sports, Dance, Movement and the Brain: A Symposium
April 21-23, 1995 • The Art Institute of Chicago



Music and the Brain: A Symposium

November 16-18, 1992 • The Art Institute of Chicago



Presented by
The Foundation for Human Potential
Chicago Symphony Orchestra
The School of the Art Institute of Chicago

with sponsorship by
National Institute of Mental Health
Stouffer Riviere Hotel
USAir

As the second in a series of symposia designed to explore the bases of creativity which began in 1988 with "Art and the Brain: A Symposium and Art Exhibit", the primary goal of this symposium is to stimulate interdisciplinary cooperative research concerning the possible relationship between musical ability and neurologic functioning, particularly at the cognitive level.

It will bring together professionals pre-eminent in the field of neuroscience, including neurology, psychiatry, neuropsychology, neuropsychiatry, and neurosurgery; the field of music, including composition, performance, history, theory, therapy and education; and the fields of education, learning disabilities, speech pathology, developmental psychology and cultural anthropology.

Lectures and panel discussions are designed for the educated general public and specialists. Issues to be explored are the definition of music; the variables involved in musical ability; musical development within both the species and the individual; the notion of multiple creative talents in individuals; psychological models of the brain; the effect of brain disorders upon musical ability; the relative contributions of specific areas of the brain to musical ability; and studies of well-known musicians

with known or suspected neurologic histories. As a complement to the lectures there will be a musical performance by Tony Deblois, an autistic, blind pianist and a 1991 recipient of the Itzhak Perlman Award from Very Special Arts of the John F. Kennedy Center for the Performing Arts in Washington DC. The purpose of the performance is to highlight exceptional skill in the face of significant deficits and thereby comment on human potential and foster the appreciation of individual differences.

Director

Andrea Gellin Shindler
Executive Director
The Foundation for Human Potential
Chicago, Illinois

Music Advisor

David Epstein
Professor of Music
Music and Theater Arts Section
Massachusetts Institute of Technology
Cambridge, Massachusetts

Neurology Advisor

John C.M. Brust, M.D.
Professor of Neurology
Department of Neurology
Columbia University College of Physicians and Surgeons
New York, New York