

LEARNING AND THE BRAIN: MYTHS AND REALITIES

A Symposium

Friday, September 15, 2000 at The Art Institute of Chicago

Presented by:

The Foundation for Human Potential

The School of The Art Institute of Chicago



DIRECTOR

ANDREA GELLIN SHINDLER

Founder and Executive Director
The Foundation for Human Potential
Wilmette, IL

Author

CONTEMPLATING CREATIVITY

published in the 1997 *Encyclopaedia Britannica*
Medical and Health Annual

Special thanks to
BOWNE OF CHICAGO, INC.
for contributing the printing
of this syllabus

HARVARD UNIVERSITY
GRADUATE SCHOOL OF EDUCATION

ROY E. LARSEN HALL, 2ND FLOOR
APPKN WAY
HARVARD GRADUATE SCHOOL OF EDUCATION
CAMBRIDGE, MA 02138

1-617-496-4929 (TEL)
1-617-496-4855 (FAX)

May 10, 2000

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 the current symposium entitled Learning and the Brain: Myths and Realities, to be held on September 15, 2000 at The Art Institute of Chicago. The Foundation is now celebrating its 10th anniversary, having established a reputation of an organization providing outstanding educational programs to the public, focused on learning, creativity and brain function.

I have participated in two of the five symposia and consider them to have been among the most important and memorable meetings that I have attended. For all meetings to date, Andrea Gellin Shindler, the Founder and Executive Director of The Foundation, has brought together an outstanding group of researchers from many disciplines, as well as the educated public. Additionally, she has featured individuals who, despite a variety of impairments, have **achieved** extraordinary accomplishments in the arts and sports. The tone of the proceedings and the discussions and interchanges following the presentations have been impressive. It is no exaggeration to say that many of those in attendance have been marked by a bond. I know that I have had the opportunity to remain in contact and build upon the relations forged at these meetings. My discussions with colleagues and symposium participants confirm that they have been similarly touched.

John Bruer, cognitive psychologist and author of The Myth of the First Three Years is the keynote speaker of the upcoming symposium. He is an outstanding choice. John convincingly debunks current hype about brain research and learning. His careful discussion and eminently sensible conclusions should give pause to those who propose grandiose policies or issue dire warning on the basis of scanty or ambiguous data. Bruer's perspective, as well as those of other guest faculty, should provide a rich experience for all participants. Communication among the guest faculty and attendees may well stimulate new research directions.


As a member of The Foundation's Advisory Board, I have been delighted by the careful planning that has gone into each of the symposia. Each has been remarkably successful and memorable.

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 Foundation addresses issues in a research context, as well as an educational one. I applaud and support these endeavors, in part because of the possible benefits to educators, children and adults

Why is this work important? First, 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. Second, damage to the brain continues to be one of the principal human afflictions. By continuing to bring together first rate researchers in many disciplines, educators and the public, understanding of all constituent groups will be enhanced, resulting in meaningful dialogue which can best stimulate new directions in research and teaching. For all of these reasons, I hope that it will prove possible to secure the support **that** The Foundation needs to continue this fine work.

I would be happy to provide additional information, as requested,

Sincerely Yours,

A handwritten signature in cursive script, appearing to read "H Gardner". The signature is written in dark ink on a light background.

Howard Gardner

John H. Elisabeth A. Hobbs Professor of Cognition and Education



Department of Psychology
5848 S. University Avenue
Chicago, Illinois 60637

July 6, 2000

Andrea Shindler
The Foundation for Human Potential
428 Wilshire Drive East
Wilmette, IL 60091

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 you directed on **Art and the Brain** (1988), **Music and the Brain** (1992), **Sports, Dance, Movement and the Brain** (1995), and **Emotional Intelligence, Education, and the Brain** (1997) are major contributions toward the integration of science, education, and human values. They 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. Much more is needed. The conference on **Learning and the Brain: Myths and Realities**, to be held this coming September, addresses the crucial distinction between neurological discoveries, on the one hand, and speculations regarding their educational implications, on the other hand. Without a clear understanding of this distinction, our children are in danger of becoming victims of failed educational experiments.

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

Yo-Yo E, Ma

August 30,2000

To Whom It May Concern:

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

The Foundation for Human Potential is a vital organization that deals with research on such topics of immense and increasing interest. Now celebrating its tenth anniversary, the Foundation continues to engage researchers of many disciplines, educators and the public in a rich exchange, continually searching for a broader understanding of the brain-behavior relationship. As we continue to make advances in neurological research, increasing substantial scientific data on such topics as the presence of chemical patterns and their relationships to artistic output, we will perhaps one day be able to reveal elements common to all mankind.

I wish the Foundation for Human Potential continued success in this tremendous and worthwhile endeavor.

Sincerely,



Yo-Yo Ma

THE UNIVERSITY OF IOWA



DATE: August 22, 2000

FROM: Antonio R. Damasio
M.W. Van Alien Professor and Head
Department of Neurology
University of Iowa College of Medicine

RE: The Foundation for Human Potential

The Foundation for Human Potential has undertaken an ambitious program to disseminate knowledge connecting 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 make their activities more clearly understood to the lay public.

The Foundation's efforts have touched many individuals in the Chicago area and elsewhere. I look forward to seeing it continue its activities especially if they will be focused on the area of education.

The Foundation for Human Potential deserves our appreciation and support.



The University of Chicago
DEPARTMENT OF PSYCHOLOGY

COMMITTEE ON HUMAN DEVELOPMENT
5848 SOUTH UNIVERSITY AVENUE
CHICAGO • ILLINOIS 60637
(312) 702-9125
FAX: (312) 702-0886

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

LEARNING AND THE BRAIN: MYTHS AND REALITIES
A SYMPOSIUM

Friday, September 15, 2000

Presented by: The Foundation for Human Potential and
The School of the Art Institute of Chicago
at The Art Institute of Chicago

Revised Schedule

<u>Time</u>	<u>Lecture Topic</u>	<u>Speaker</u>
7:30am-8:15am	REGISTRATION	
8:30am-8:35am	Welcome Address	T. Jones
8:35am-8:40am	Acknowledgments/Symposium Evolution	A. Shindler
8:40am-9:25am	Making Connections Carefully: The Relationship Between Mind, Brain and Behavior	J. Bruer
9:25am-10:00am	Synaptogenesis in the Human Cerebral Cortex	P. Huttenlocher
10:00am-10:35am	Experience and Brain Plasticity: Interpreting the Significance of Basic Research for Child Rearing and Education	W. Greenough
10:35am-10:50am	BREAK	
10:50am-11:30am	Panel/Questions	
11:30am-12:45pm	LUNCH	
1:00pm-1:35pm	The Emotion Factor	A. Damasio
1:35pm-2:10pm	How Memory Develops	C. Nelson
2:10pm-2:45pm	The Scientist in the Crib: What Early Learning Teaches Us About the Nature of the Mind	A. Gopnik
2:45pm-3:20pm	Perspectives on Mind-Brain	J. Levy
3:20-3:30pm	BREAK	
3:30pm-4:20pm	Panel/Questions/Closing Summary	

LEARNING & THE BRAIN: MYTHS & REALITIES

Presented by: The Foundation for Human Potential and

The School of the Art Institute of Chicago

Friday, September 15, 2000

Bachevalier, J. (1992). Cortical versus limbic immaturity: Relationship to infantile amnesia. In M.R. Gunnar & C.A. Nelson (Eds.), *Minnesota Symposia on Child Psychology: Developmental Neuroscience..* Vol. 24 (pp. 129-153). New York: Lawrence Erlbaum Associates.

Bachevalier, J. (1990). Ontogenetic development of habit and memory formation in primates. In A. Diamond (Ed.), *Development and Neural Bases of Higher Cognitive Functions* (pp. 457-484). New York: New York Academy of Sciences Press.

Bachevalier, J., Brickson, M., & Hagger, C. (1993). Limbic-dependent recognition memory in monkeys develops early in infancy. *NeuroReport*, 4, 77-80.

Bachevalier, J., Hagger, C., & Mishkin, M. (1991). Functional maturation of the occipitotemporal pathway in infant rhesus monkeys^ In N.A. Lassen, D.H. Ingvar, M.E. Raichle, L. Friberg (Eds.), *Brain Work and Mental Activity* (pp. 231-240). Copenhagen: Munksgaard.

Bachevalier, J., & Mishkin, M. (1984). An early and a late developing system for learning and retention in infant monkeys. *Behavioral Neuroscience*, 98, 770-778.

Bauer, P.J. (1996). Development of memory in early childhood. In N. Cowan (Ed.), *The Development of Memory in Childhood*. London: University College London Press.

Bauer, P.J. (1997). Development of memory in early childhood. In N. Cowan (Ed.), *The Development of Memory in Childhood* (pp. 83-111). Hove East Sussex: Psychology Press.

Bauer, P.J. (1995). Recalling past events: From infancy to early childhood. *Annals of Child Development*, 11, 25-71.

Bauer, P.J., Hertsgaard, L.A., & Dow, G.A. (1994). After 8 months have passed: Long-term recall of events by 1- and 2-year-old children. *Memory*, 2, 353-383.

Bauer, P.J., Kroupina, M.G., Schwade, J.A., Dropik, P., & Wewerka, S.S. (1998). If memory serves, will language? Later verbal accessibility of early memories. *Development and Psychopathology*, 10(4), 655-679.

Black, I.E., Jones, T.A., Nelson, C.A., & Greenough, W.T. (1998). Neuronal plasticity and the developing brain. In N.E. Alessi, J.T. Coyle, S.I. Harrison, & S.Eth. (Eds.), Handbook of Child and Adolescent Psychiatry. Vol. 6, Basic Psychiatric Science and Treatment (pp. 31-53). John Wiley & Sons: New York.

Bloom, F.E., Nelson C. A. and Lazerson, A. (in press - due out late summer, 2000). Brain. Mind and Behavior (3rd edition). Worth Publishing, New York.

Bloom, F.E., Nelson, C.A., & Lazerson, A. (in press). Brain. Mind, and Behavior (3rd ed). New York: Worth Publishing.

Bransford, J.D., Brown, A.L., Cocking, R.R. (Eds.) (1999) How People Learn: Brain. Mind. Experience and School. National Academy Press, Washington, D.C.

Bruer, J.T. (1999) The Myth of the First Three Years: A New Understanding of Early Brain Development and Lifelong Learning. The Free Press, a division of Simon & Schuster, Inc., NY, NY.

Bruer, John (1993) Schools for Thought. MIT Press.

Carson, B. (1990) Gifted Hands: The Ben Carson Story Zondervan Publ. House and Review, Grand Rapids, MI/Review and Herald Publ. Assoc.

Carson, B. (1999) The Big Picture: Getting Perspective on What's Really Important in Life. Zondervan Publ. House, Grand Rapids, MI.

Carver, L.J., Bauer, P.J., & Nelson, C.A. (in press). Associations Between Infant Brain Activity and Recall Memory. Developmental Science.

Casey, B.J., Cohen, J.D., Jezzard, P., Turner, R., Noll, D.C., Trainor, R.J., Giedd, J., Kaysen, D., Hertz-Pannier, L., & Rappaport, J.L. (1995). Activation of prefrontal cortex in children during a non-spatial working memory task with functional MRI. *Neuroimage*, 2, 221-229.

Coles, R. (1997) The Moral Intelligence of Children. Random House, Inc. NY, NY.

Cowan, N. (1997). The Development of Memory in Childhood. Hove, East Sussex, UK: Psychology Press.

Damasio, A.,(1999) The Feeling of What Happens: Body. Mind and Emotion in the Making of Consciousness. Harcourt, Brace & Co., NY.

Damasio, A., (1994) Descartes' Error: Emotion, Reason and the Human Brain. Grosset Putnam Book/G.P. Putnam & Sons, NY, NY.

de Haan, M, Bauer, P.J., Georgieff, M.K. & Nelson, C.A. (in press). Memory for Event Sequences in Low Risk Toddlers Born Between 27-42 weeks of Gestation. *Developmental Medicine and Child Neurology.*

de Haan, M. & Nelson, C.A. (1999). Brain activity differentiates face and object processing in 6-month old infants. *Developmental Psychology*, 35, 1113-1121.

de Haan, M., & Nelson, C.A. (1997). Recognition of the mother's face by 6-month old infants: A Neurobehavioral Study. *Child Development*, 68, 187-210.

Diamond, A. (1995). Evidence of robust recognition memory early in life even when assessed by reaching behavior. *Journal of Experimental Child Psychology*, 59, 419-474.

Diamond, A., & Doar, B. (1989). The performance of human infants on a measure of frontal cortex function, the delayed response task. *Developmental Psychobiology*, 22, 271-294.

Diamond, D.M., Fleshner, J., Ingersoll, N., & Rose, G.M. (1996). Psychological stress impairs spatial working memory: Relevance to electrophysiological studies of hippocampal function. *Behavioral Neuroscience*, 110-661-772.

Gardner, H. (1999) The Disciplined Mind: What All Students Should Understand. Simon & Schuster, NY.

Gardner, H. (1999) Intelligence Reframed: Multiple Intelligence for the 21st Century. Basic Books, NY, NY.

Gopnik, A., Meltzoff, H.N., Kuhl, P.K. (1999) The Scientist in the Crib: Minds, Brains and How Children Learn Wm. Mcrow & Co., NY, NY.

Hilts, P.J. (1995). The Strange Tale of Mr. M. and the Nature of Memory. New York: Simon & Schuster.

Howe, M.L., & Courage, M.L. (1993). On resolving the enigma of infantile amnesia. *Psychological Bulletin*, 113, 305-326.

Mandler, J M. (1990). Recall of Events by Preverbal Children. In A. Diamond (Editor), *The development and neural bases of higher cognitive functions* (pp. 485-516). New York: New York Academy of Science.

Nelson, C.A. (in press - due out late summer 2000). The Effects of Early Adversity on Neurobehavioral Development. Minnesota Symposia on Child Psychology (Vol. 31). New Jersey. Lawrence Erlbaum

Nelson, C.A. (1994). Neural correlates of recognition memory in the first postnatal year of life. In G. Dawson & K. Fischer (Eds.), *Human Behavior and the Developing Brain* (p. 269-313). NY: Guilford Press.

Nelson, C.A. (1995). The ontogeny of human memory: A Cognitive Neuroscience Perspective. *Developmental Psychology*, 31, 723-735.

Nelson, C.A. (1996). Electrophysiological correlates of early memory development. In H.W. Reese and M.D. Franzen (Eds.), *Thirteenth West Virginia University Conference on Life Span Developmental Psychology: Biological and Neuropsychological Mechanisms*, (pp. 95-131). New Jersey: Lawrence Erlbaum.

Nelson, C.A. (1997). The neurobiological basis of early memory development. In N. Cowan Ed. *The Development of Memory in Childhood* (pp. 41-82). Hove, East Sussex, UK: Psychology Press.

Nelson, C.A., & Bloom, F.E. (1997). Child development and neuroscience. *Child Development*, 68, 970-987.

Nelson, C.A. (1998). The nature of early memory. *Preventive Medicine*, 27, 172-179.

Nelson, C.A., & Carver, L.J. (1998). The effects of stress on brain and memory: A view from developmental cognitive neuroscience. *Development and Psychopathology*, 10, 793-809.

Nelson, C.A., & Kukkette, D. (1998). A cognitive neuroscience perspective on the relation between attention and memory development. In J.E. Richards (Ed.), *Cognitive Neuroscience of Attention: A Developmental Perspective* (pp. 327-362). Lawrence Erlbaum Publishers: NJ.

Nelson, C.A., Thomas, K., de Haan, M., & Wewerka, S. (1998). Delayed recognition memory in infants and adults as revealed by event-related potentials. *International Journal of Psychophysiology*, 29, 145-165.

Nelson, C.A., Lin, J., Carver, L.J., Monk, C.S., Thomas, K.M., & Truwit, C.L. (2000). Functional neuroanatomy of spatial working memory in children, *Developmental Psychology*, 36, 109-116.

- Paley, V. (1999) The Kindness of Children. Harvard University Press.
- Palmer, P. (1998) The Courage to Teach. Jossey-Bass Publ., San Francisco, CA.
- Pascalis, O., deHaan, M., Nelson, C.A., & de Schonen, S. (1998). Long term recognition memory assessed by visual paired comparison in 3 and 6 month old Infants., *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 24, 1-12.
- Rovee-Collier, C. (1996). Development of Memory in Infancy. In N. Cowan (Ed.), *The Development of Memory in Childhood*. London: University College London Press.
- Schacter, D.L. (1996). Search for Memory: The Brain, the Mind, and the Past. New York: Basic Books.
- Schacter, D.L., & Tulving, E. (1994). What are the memory systems of 1994? In D.L. Schacter & E. Tulving (Eds.), *Memory Systems of 1994* (pp. 1-38). Cambridge, MA: MIT Press.
- Sizer T.R. and Sizer N.F. (1999) The Students are Watching: Schools and the Moral Contract. Beacon Press, Boston, MA.
- Squire, L.R. (1986). Mechanisms of Memory, *Science*, 232, 1612-1619.
- Squire, L.R. (1987). Memory and Brain. New York: Oxford Press.
- Squire, L.R., & Zola-Morgan, S. (1991). The medial temporal lobe memory system. *Science*, 253, 1380-1386.
- Squire, L.R., Ojemann, J.G., Miezin, P.M., Petersen, S.E., Videen, T.O., & Raichle, M.E. (1992). Activation of the hippocampus in normal humans: A functional anatomical study of memory. *Proceedings of the National Academy of Sciences, U.S.A.*, 89, 1837-1841.
- Squire, L.R. (1992), Declarative and non-declarative memory: Multiple brain systems supporting learning and memory. *Journal of Cognitive Neuroscience*, 4, 232-243.
- Squire, L.R., (1994). Declarative and non-declarative memory: Multiple brain systems supporting learning and memory. In D.L. Schacter & E. Tulving (Eds.), *Memory Systems 1994* (pp. 203-231). Cambridge, MA: MIT Press.

Sternberg, R., Grigorenko, E. (1999) Our Labeled Children: What Every Parent and Teacher Needs to Know About Learning Disabilities. Perseus Books Group, Reading, MA.

Thompson, R. A. & Nelson, C. A. Developmental Science and the Media: Early Brain Development. Manuscript Under Review in American Psychologist.

Tulving, E. (1985). How many memory systems are there? *American Psychologist*, 40, 385-398.

Ungerleider, L.G. (1995). Functional brain imaging studies of cortical mechanisms for memory. *Science* 270, 769-775.

Vargha-Khadem, F., Gadian, D.G., Watkins, K.E., Connelly, A., Van Paesschen, W. Van, & Mishkin, M. (1997). Differential effects of early hippocampal pathology on episodic and semantic memory. *Science*, 277, 376-380.

Webb, S., & Nelson, C.A. (2000). Neural correlates of perceptual priming in human adults and infants. *Journal of Experimental Child Psychology*.

Webster, M.J., Bachevalier, J., & Ungerleider, L.G. (1995). Development and plasticity of visual memory circuits. In B. Julesz & I. Kovacs (Eds.), *Maturational Windows and Adult Cortical Plasticity* (pp. 73-86). New York: Addison-Wesley.

Webster, M.J., Ungerleider, L.G., & Bachevalier, J. (1991, a). Lesions of inferior temporal area TE in infant monkeys alter cortico-amygdalar projections. *Developmental Neuroscience*, 2, 769-772.

Webster, M.J., Ungerleider, L.G., & Bachevalier, J. (1991, b). Connections of inferior temporal areas TE and TEO with medial temporal-lobe structures in infant and adult monkeys. *Journal of Neuroscience*, 11, 1095-1116.

Wiggins, G., McTighe, J. (1998) Understanding by Design. Association for Supervision and Curriculum Development, Alexandria, VA.

Wilson, F.R. (1998) The Hand: How its Use Shapes the Brain. Language and Human Culture. Pantheon Books, a Division of Random House, NY and Toronto.

Wiske, M.S. (Ed.) (1998) Teaching for Understanding: Linking Research with Practice. Jossey-Bass, Inc., San Francisco, CA.