October 31, 2002

FOR THE PROFESSIONAL MUSIC EDUCATOR
THE "MOZART EFFECT" -
RESEARCH ON MUSIC AND THE DEVELOPING BRAIN, AND MORE ...,

INTRODUCTION

Neuroscientists have intensified their research into music and its role in the developing brain. This is partly due to evolving diagnostic techniques and technology, and due, also, to the growing awareness of the probative opportunities presented by such studies. The Suzuki Music Academy produces this gateway to fascinating information and ideas arising from current research.

The Mozart Effect
Online Resources on Music/Brain Research

The buzzword, "Mozart Effect", has been bandied about by popular print and broadcast media. It is featured in parenting, education, and music oriented publications, and in the mainstream general press. While it has renewed interest in classical music education and focused much deserved attention on the general field of childhood development, the phrase (and the popular notion of its meaning) has been used to sell music lessons, music products of all kinds, including "Mozart Makes You Smarter" product lines, and frankly, some music education snake-oil.

What's behind this popular "concept"? Where did it originate? What does it really mean? Does listening to Mozart really make you smarter? If so, how? In what way? Is this claim real or just a hype? What to make of it all?

Here is a collection of links to promotional pieces and authoritative online resources that can provide some answers. While there is editorializing and there are commentaries found on this page and in the linked material dealing with the research surrounding the "Mozart Effect", ultimately, the reader is responsible for applying critical thinking to sort it all out.

The term "Mozart Effect" arose from the work of University of California at Irvine's formidable team, Dr. Francis Raucher, Dr. Gordon L. Shaw, and their colleagues. Their neuroscience/music studies and their findings have caused quite an impact on related fields and some controversy. After exploring the materials, linked here, whatever conclusions you come to, you will have to admit that this is very intriguing stuff.

Before exploring links to the materials appearing here, gain some valuable perpective on the subject by going to the link to the article, On the Importance of Being Accurate, published in *The Music and Science Information Computer Archive,* (MuSICA).

MuSICA's editor, N. M. Weinberger, shows insight that is nothing short of brilliant. A comprehensive catalogue of and links to MuSICA, found below in a separate section, contain abstracts that provide an overview of a wide range of neuroscience music/brain research, along with material dealing directly with the "Mozart Effect" and which could have been included in this section.

The purpose for assembling this collection of links to resources is to shine light on this subject and on research that has received much well-deserved attention, but has, too often, been trivialized and misrepresented. Bookmark this page to return for updates.

- Richard Coff, Founder / Director

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The "Mozart Effect" Research

After clicking this NEW file, you can minimize all open windows in IE or Netscape browsers - (won't work with AOL browser) - to eliminate background music when hearing this interview with Francis Rauscher. The segment of the April 4, 1997 edition of NPR Science Friday features advances in neuroscience research. Interviewer Ira Flato asks probing questions that help clarify the meaning of Rauscher's research and Rauscher's thoughts about the research. Fred Gage Professor, Laboratory of Genetics Salk Institute for Biological Studies La Jolla, California, also takes part and discusses research into neurogenesis.

NEW by Debra Viadero appears on the on the April 8, 1998 edition of the online publication *Education Week on the Web*. This unusually thoughtful article raises important issues and brings a valuable perspective to the subject of brain / music research and the hype surrounding it. Also, see the chart entitled for a chart tracking some of the key research that has received so much attention.

NEW is a promotional piece about Shaw and Rauscher's work.

- Music and Spatial Task Performance: A Causal Relationship by Frances H. Rauscher, Gordon L. Shaw, Linda J. Levine, and Katherine N. Ky of the University of California Irvine, and Eric L Wright of the Irvine Conservatory of Music - Presented at the American Psychological Association's 102nd Annual Convention in Los Angeles, /CA

- Design and Procedure for first of two studies (Rauscher, Shaw and Ky, 1993).

-Description of second of two studies.

- References that underpin Raischer, et. al., studies.

- Press release published by The American Music Conference, more on work by Frances H. Rauscher,*et al.*

- Frances H. Rauscher fields questions about Music/Brain research.

- by Dr. Rauscher discusses the approach taken by Rauscher and colleagues that employs a concept of the mapping of pitches and instrumental timbre onto neural model, the use of computerized analogues of these, and the coding of aspects of musical structure in human composition and perception. Also, the notion of he shared neural networks activated in the processing of music and that of reasoning in spatial domains.

- Description of the work of Francis Rauscher and colleagues that resulted the creation of public policy that promotes classical music for children.

- Article by Mark Ward appearing in the Milwaukee Journal Sentinel, April 8, 1997 - "Science Matters". This generally good non-technical report on the findings from the research of Francis Rauscher, et al, is flawed by the assertion that "Children whose brains don't make those connections at an early age may never make them. That's because after a few years their brains stop making so many connections and start pruning unused neurons." Ward corrects this, somewhat, by the writing that

follows. *see* On the Importance of Being Accurate

- Interesting references concerning the benefits that come from music study, published by The American Music Conference.

- Chronology published by The American Music Conference.

- Thoughtful correspondence on the subject of music and its relationship to the causal effect of enhanced cognitive skills. The discussion here references the "Mozart Effect" and Rauscher and Shaw's findings.

- UCI Journal reports on work of Rauscher and Shaw.

- Media Release on Rauscher and Shaws studies.

- Just chronological reference here, published by The American Music Conference. Primarily of interest to those who want to know more about the particular sequence of research that has evolved into the most current studies undertaken by Rauscher, Shaw, Leng, et al. Tracks dates and gives a brief summary of the research.

- Summary and commentary on Gordon Shaws work with music and intelligence.

- Background on Gordon L. Shaw, including a description of Shaw's approach to research that uses music to examine higher brain function, the spatial and temporal structure of the cortex, spatial-temporal neuronal firing patterns in the cortex, and the trion model of the cortex.

New Category (The "Beethoven Effect"?)

- An overview of music and perception studies, by Beth Azar, published on the APA Monitor site by the American Psychological Association. Ms. Azar begins the article by discussing the fact of Beethoven's work as an active composer after loosing his ability to hear, and she then proceeds to review the auditory mechanics of the inner ear and studies that are "mapping the brain", dealing with differentiated functions for right/left hemispheres.

The MuSICA Archive

Below are links to articles from the online journal, MuSICA, an especially valuable resource that deals with research into the music's role in brain developement. "The Mozart Effect" is only one of many intriguing subjects discussed. MuSICA's knowledgable editor, N. M. Weinberger, provides an exceptionally well-informed and balanced perspective on the subject of music/brain research in his reports and commentaries on the studies undertaken by neuroscientists who are engaged in research that explores the music/brain connection.

THE "MOZART EFFECT" AND ENHANCED INTELLIGENCE

- Report on research by Frances Rauscher, Gordon Shaw and Katherine Ky (Nature, 1993, 365, p. 611)

- Research on the effect of "passive listening" on brain function that is being carried out by Rauscher and colleagues at the University of California Irvine.

- N. M. Weinberger gives an excellent overview of the hype that has accompanied and trivialized the findings of the studies that have indicated the existence of a so-called, "Mozart Effect", and related current research that explores the connection between music and brain development.

MORE ON MUSIC AND YOUNG CHILDREN

NEW - Mozart is perhaps the best known of children composers, but children's capacity to compose is, by no means, confined to child prodigies. The process of musical composition encompasses a number of interelated cognitive and perceptual operations. An overview of studies dealing with children and musical composition show results that raise interesting questions, as well as, answers.

NEW - Editorial that deals with young children and early development of musical preferences and interests.

NEW Summary of the study by Balaban M.T., Anderson, L.M., & Wisniewski, A.B. (1998), "Lateral asymmetries in infant melody perception" *Developmental Psychology*, 34:39-48.

- This report deals with the relationship between music education and cognitive achievement. It dicusses and analyzes findings that suggest that: those receiving music education training have an advantage when learning to read, music/dance enhance "creativity", and, musical training enhances abstract cognitive ability in the area of spatial abilities.

- Reorganization of brain function and evidence of these processes in children are subjects of the study reported here.

- Discussion of a study that uses music to probe the minds of infants.

- Reports on research on musical effects on foetuses and neo-natals.

- Discussion of the way consonance and dissonance is perceived and process.

- Report on studies that explore the ability of infants to hear and process music.

- Studies indicate a powerful music/language connection in infants.

MUSIC, MEMORY, AND LEARNING

- Opinions and reports on music research and its meaning.

- Declarative and procedural memory and the neurological mechanisms involved in processing of music are the subjects of new music/brain research.

- Studies involving music and contextual memory are reviewed.

- A discussion of declarative and procedural memory modes and how these are utilized in musical experience.

- About a study that suggests that musicians demonstrate enhanced capacity to memorize musical tones.

- Report on the research into the way different regions of the human brain cooperate in the processing of music.

- New studies employing diagnostic techniques for determining "creativity" and the music connection are reported.

NURTURE VS. NATURE / EDUCATION VS. TALENT

- Reports on arguments supporting the idea that, traditionally, the role of inborn "talent" is greatly overstated. Music education professionals should take note of this excellent review.

- Essay that revises traditional notions concerning the expertise of trained musicians and so-called, "regular people".

- This very important and extremely perceptive article/essay corrects the misguided notion that older students who are just beginning musical study are, somehow, "doomed". Bravo, Dr. Weinberger!

- Convincing argument that supports the view that music is a biological imperative.

- Musical expression as a biological imperative.

MORE EXTRA-MUSICAL EFFECTS

- An uncommonly insightful essay about a subject that music education advocates tend to mindlessly hype. Here, Professor Weinberger manages to give due consideration to the whole question of the general benefits that music brings, while avoiding exaggerated claims.

- Discusses some of the problems encountered by music education advocates, re: communicating the extra-musical benefits that music study and appreciation bring.

- Report of preliminary demographic study of music's effect on health and longevity.

- Review of an interesting but inconclusive study that suggests a correlation between "musical responsiveness" and interpersonal competencies.

- Review of a study by Elbert and co-workers and reported in Science (1995, 270, 305-307). Elbert's team demonstrate "[i]ncreased cortical representation" in musicians, corresponding to activity of musician's fingers.

MUSIC, EMOTION, AND MOOD

- Speculation on the potential to study the emotional effect that music creates and reviews of the work of neuroscientists who have begun research into this area.

- Essay that discusses the music/emotion link and the way music influences mood and memory.

- Deals with important hormonal effects that are related to musical experience.

- Report on preliminary studies that demonstrate children's ability to experience emotional meaning from music.

BRAIN PROCESSING AND MUSIC PERCEPTION

NEW - Briefly noted, the work of Daniel Levitin and Ursula Bellugi who are exploring the unique characteristics of Williams syndrome. Williams syndrome and the special musical aptitude those with Williams syndrome seem to possess were recently featured on CBS 60 Minutes.

NEW - Brief note of "Cognitive test performance and background music" by Cockerton, T., Moore, S., & Norman, D. (1997) that appeared in publication, *Perceptual and Motor Skills*, 85:1435-1438. The study, while inconclusive, adds to the studies that are investigating the relationship between passive listening to music and cognitive performance.

- Reviews a study that tests the notion of inborn musical aptitude through the application of diagnostic technology that enables quantification of "pre-attentive" or unconscious perception.

- is an article about studies of pitch perception that seek to define the role of the brain in the processing pitch.

- Explanation of perceptual integration in the processing of music.

- Reflections about the process of sight-reading music an the probative value of examining this activity.

- Report on research into the relationship between musical skills and anatomical differences in brains that are due to factors of training and gender.

- Review of preliminary studies and speculation about further inquiry concerning music and the brain of the musician.

- Briefly noted, a study uses treatment of language dysfunction to show functional and physical evidence that underscores the connection between language and music.

RESEARCH CONSIDERATIONS

- Under the heading "Matters of Opinion", this is a call for an expanded criteria in assessing the role and value of music in education and in general human experience.

- Thesis that interdisciplinary work with music and medicine is an essential area of study. Such approaches lead to more meaningful understanding of the role and processing of music.

- Speculation on music therapy and its potential.

- Explanation of disparate viewpoints about music research held by some music educators.

- Appeal for more coordinated music research.

RAP? ELEVATOR MUSIC? HEAVY METAL?

- Discussion about the meaning of a study that explores the connection between Heavy Metal, Rap, and dysfunction in adolescent behavior.

- A review of "soft" research carried out by Dolf Zillman and colleagues at the University of Alabama. The team's findings are surprising and interesting, if inconclusive.

- A valiant and skilled defense of what "serious" musicians would consider "lightweight" music.

- Anecdote and reflection.

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