

# Michael Thaut: Music as a Core Cognition Function of the Human Brain

Presentation by J. Steven Moore, DMA

September 13, 2010

[www.BeyondtheNotes.com](http://www.BeyondtheNotes.com)



# Music as a Core Cognitive Function

- ✦ Philosophy of music by:
  - ✦ Michael Thaut, Ph.D.
  - ✦ Center for Biomedical Research in Music
  - ✦ Colorado State University
  - ✦ International brain researcher and founder of Neurologic Music Therapy
  - ✦ “The Musical Brain--An Artful Biological Necessity”



# The Modern Mind

- ✦ Came into being 50,000 to 100,000 years ago.
- ✦ Archaeological record shows emergence of artifacts attributed to cognitively modern mind.



# Archaeological Evidence

- ✦ Interestingly, from the beginning, modern minds were artful and artistic behavior was integral to human activity.
- ✦ Artworks and evidence of artistic behaviors predates written language and mathematical codes by tens of thousands of years.



# Timeline (years ago)

- ✦ 200,000 - weapons/tools w/ more beauty than needed
- ✦ 70,000 - cave paintings w/ significant aesthetic quality
- ✦ 50,000 - drawings & sculptures w/ recognizable images
- ✦ 38,000 - oldest music instr.: bone flute from s. Germany
- ✦ 30,000 - flutes, rattles, whistles, & percussion instr.
- ✦ 16,000 - rock engravings of dancers (implies music)
- ✦ 10,000 - Music instr. in large nos. (size of orchestra)
- ✦ 4,100 - Set of 6 pipes, tuned in octaves in Ireland



# Oldest Figurative Artworks

- ✦ Important step in development of mind as figurative artworks begin to embody symbolic representations. They have been created to stand for something else.
- ✦ Simultaneous appearance of art with modern human beings during Ice Age suggests that artistic abilities did not evolve gradually, but came in a short time span.





70,000 years ago. Cave in South Africa



36,000 years ago. Cave in southwestern Germany.





32,000 years ago. Cave paintings Lascaux, France



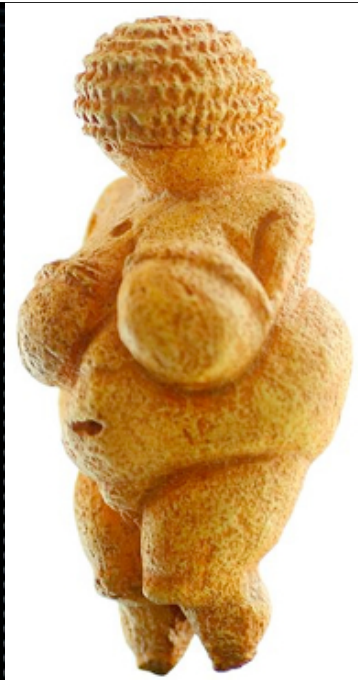
Neolithic tools (stone age). 11,000 years ago.  
Polished bracelets, axe heads, chisels.





Earliest found musical instrument. 35,000 years ago. Bone whistle with 5 holes. 8.7 inches.





23,000 years ago.  
Lower Austria.



University of  
Central Missouri.  
Warrensburg.  
1993.





# Startling Hypotheses

Music is:

- ✦ Not “icing on the cake” after basic needs of survival
- ✦ Necessary for basic survival and societal needs
- ✦ Fundamental to human brain function



# Music and the Mind

- ✦ Unlike language or visual art, music cannot express meaning in a direct manner.
- ✦ Music is purely abstract in expression.
- ✦ Music can derive meaning through association.



# Music as a Language of Sound Patterns

- ✦ Music communicates the beauty and construction of its own sound patterns.
- ✦ The brain enjoys creating and sharing these patterns.
- ✦ All humans think in abstract 'musical' sound patterns.
- ✦ Probably not learned, but biologically hardwired in brain.



# Multiple Languages of Brain

- ✦ The brain thinks in multiple languages.
  - ✦ Verbal
  - ✦ Numbers and quantities
  - ✦ Nonverbal structures of music and visual art
- ✦ Ability to think in music is fundamental to all human brains.



# Critical Brain Function

- ✦ The ability to think in abstract symbolic sound structures must have been a critical function for brain.
- ✦ Music and arts proposed as PRECURSORS and cognitive prerequisites for higher cognition.
- ✦ Music is a CORE function of the brain.



# Core Function in Children

- ✦ Children sing, play and dance as normal part of their development.
- ✦ Perhaps this biological development mirrors the critical evolutionary cognitive development of the human mind.



# Neuroscience

- ✦ Research shows that there are distinct AND shared neural circuitry between verbal language and music.
- ✦ Neuroimaging research shows interesting overlaps in brain areas for both speech and music.
  - ✦ response to syntax violations in musical and linguistic tasks
  - ✦ musical improvisation/composition and verbal tasks



# Music and Brain Research

- Certain brain regions are SUPRAMODAL processing centers for syntax and sequence.
- Training this supramodal network using ALL languages (language, numbers, music) may impact cognitive operations based in this network.



# Rhythm is Central

- ✦ Rhythm is central to music
- ✦ Rhythmic performance is associated with increased scores on general intelligence tests and increases in white matter volume in the prefrontal cortex.
- ✦ Musical training is associated with increases in academic and other cognitive abilities.
- ✦ Music and the arts are critical languages of the brain.



# Conclusion

- ✦ Evidence is strong that the early human brain was artful not as an accident.
- ✦ On the contrary: artfulness and musicality may have been the foundation for the emergence of the modern human mind.