

## **5 things to know about fighting crime with classical music**

### **Do the sounds of Bach and Vivaldi really have the power to combat loitering and other petty offenses?**

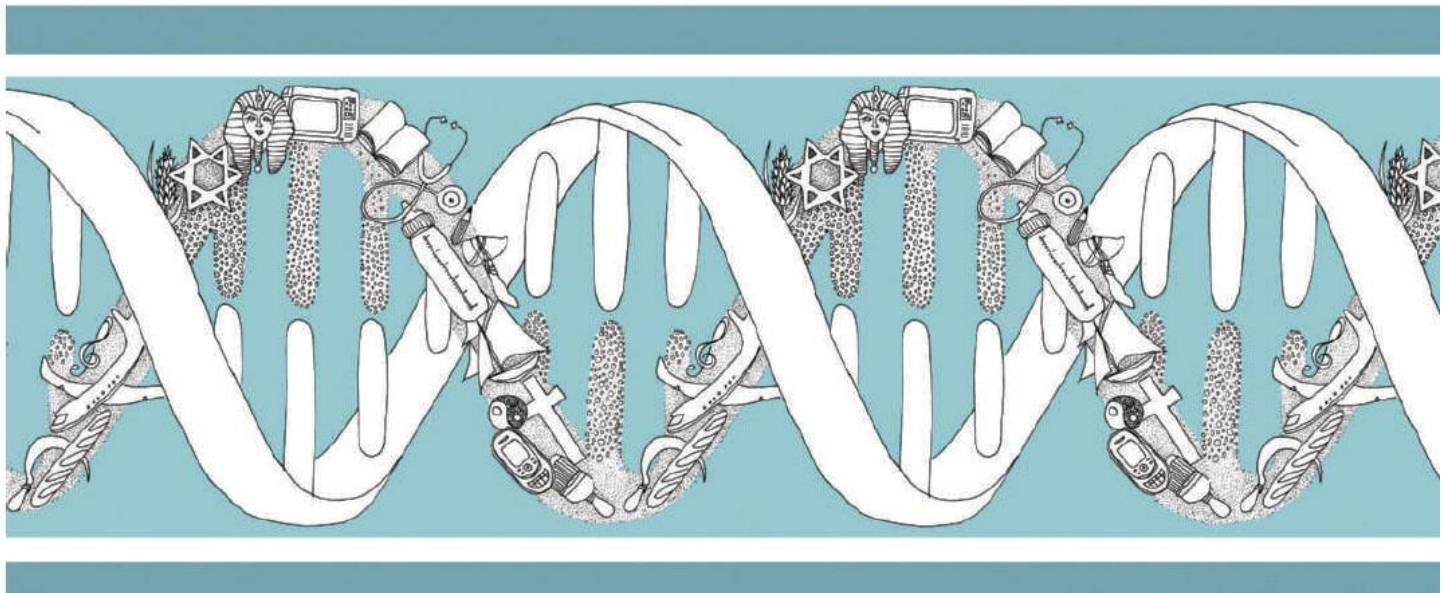
Research has suggested the positive impact various music genres can have on your mood – from [releasing stress](#) to [improving sleep quality](#). Mental health professionals have even utilized music's power on the brain in therapy. Given the dramatic effect music can have on human beings, it's no surprise that the classical music strategy has yielded results for some cities. But why, exactly, does it deter crime?

While there isn't any hard research into the phenomenon, many theories abound. According to the [Seattle Times](#), it may be the result of dopamine production in the brain

## Impact of Music, Music Lyrics, and Music Videos on Children and Youth Council on Communications and Media

Research on popular music has explored its effects on schoolwork, social interactions, mood and affect, and particularly behavior. The effect that popular music has on children's and adolescents' behavior and emotions is of paramount concern. Lyrics have become more explicit in their references to drugs, sex, and violence over the years, particularly in certain genres. A teenager's preference for certain types of music could be correlated or associated with certain behaviors.





## THE OTHER STRAND

Geneticists looked to the human genome to understand human evolution. But it's hard to interpret without considering the inheritance of culture, finds **Erika Check Hayden**.



Ludovisi Throne. Marble bas-relief, 460-450 BC.  
Museo Nazionale Romano, Rome, Italy.



First flutes. These 32,000-year-old flutes are the oldest undisputed evidence of music.





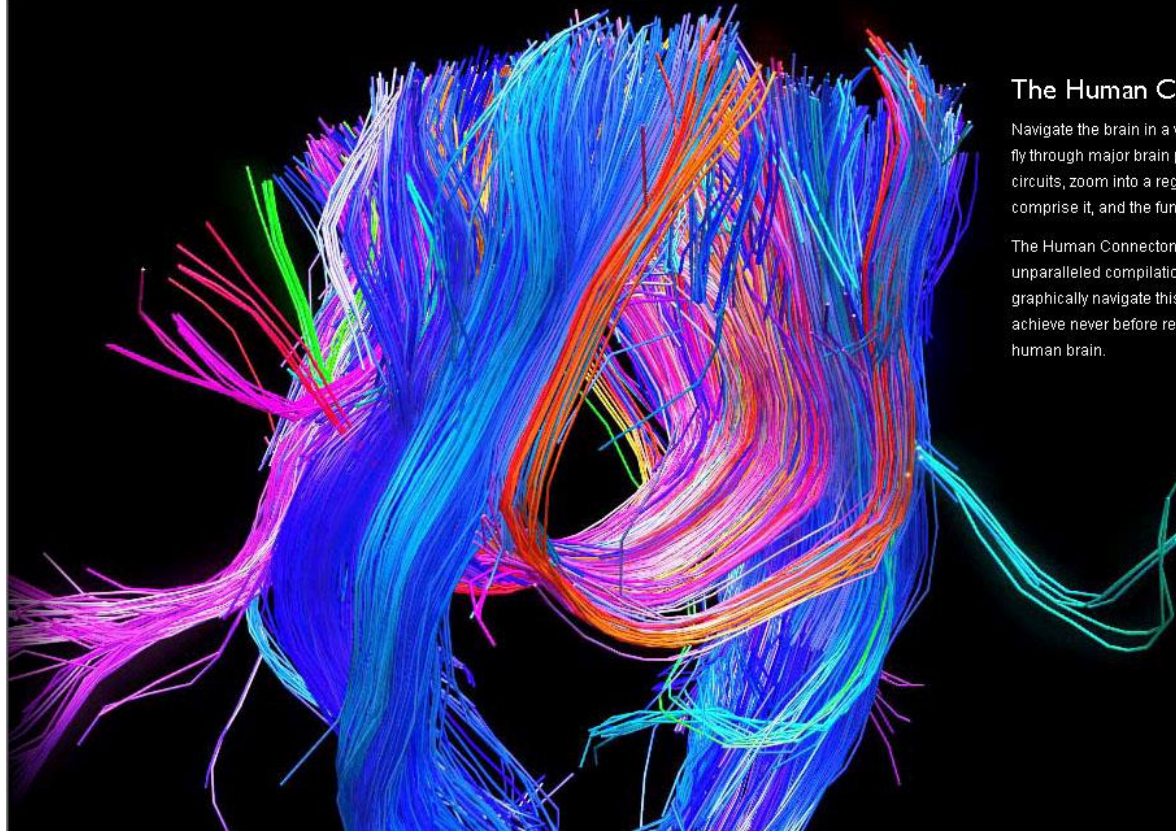


The emotional power of poetry: neural circuitry,  
psychophysiology,  
compositional principles

Inana's holy heart has been assuaged. The  
light was sweet for her, delight extended over  
her, she was full of fairest beauty.

— Enheduanna, 2285–2250 B.C.

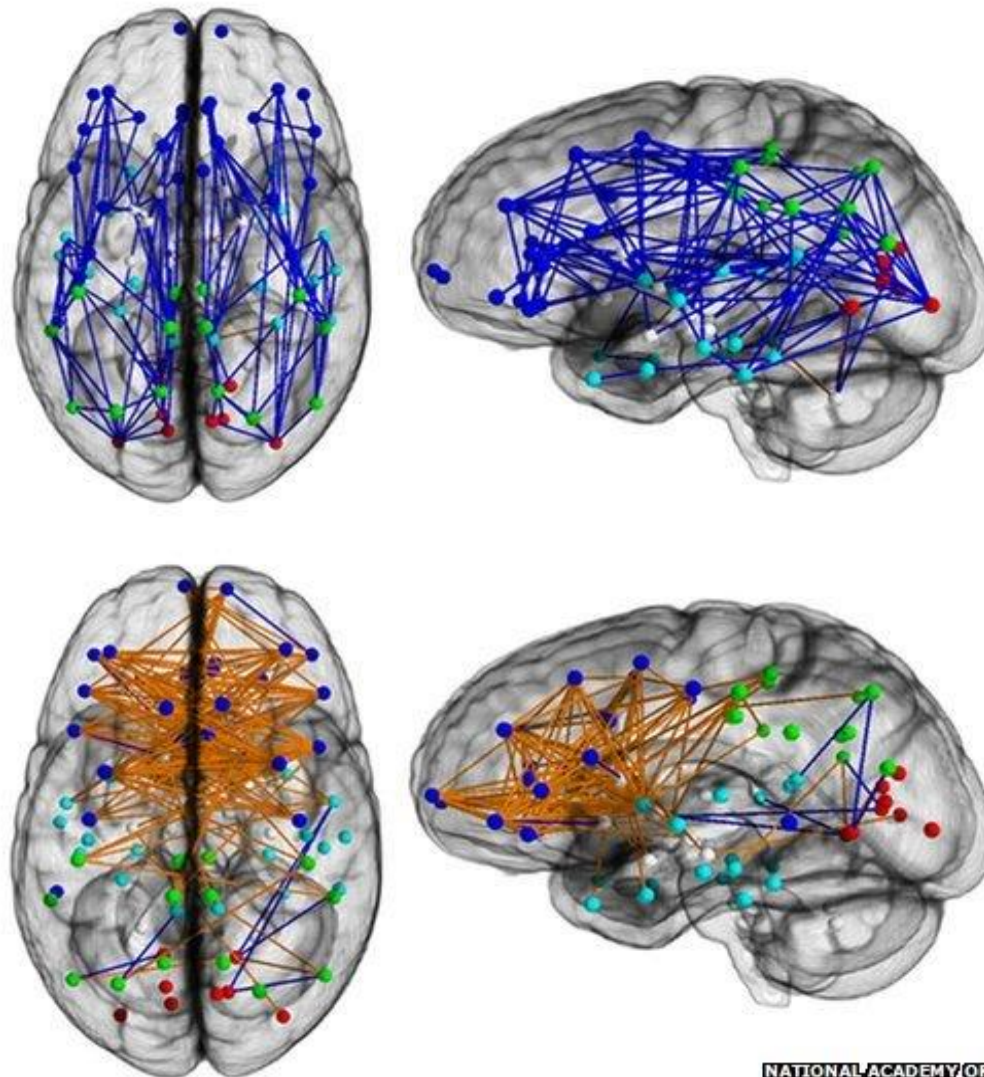
# Human Connectome Project

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## The Human Connectome Project

Navigate the brain in a way that was never before possible; fly through major brain pathways, compare essential circuits, zoom into a region to explore the cells that comprise it, and the functions that depend on it.

The Human Connectome Project aims to provide an unparalleled compilation of neural data, an interface to graphically navigate this data and the opportunity to achieve never before realized conclusions about the living human brain.



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» Who we are. I-LABS at Work



What is I-LABS?

The Institute for Learning & Brain Sciences is an interdisciplinary center dedicated to discovering the core principles of human learning, with special emphasis on work that will enable all children from 0 to 5 to achieve their full potential.

[Click here to read more](#)

Making discoveries in brain and behavior to unravel the mysteries of the developing mind

The Institute for Learning & Brain Sciences -- home to the world's first MEG brain-imaging facility focused on children -- is an interdisciplinary center dedicated to discovering the fundamental principles of human learning, with special emphasis on work that will enable all children from 0 to 5 to achieve their full potential.

In 2010, I-LABS launched the Developing Mind Project, an ambitious multi-year research initiative intended to describe brain development in children -- specifically the timeline and processes that enable a newborn to emerge into a school-ready child.

By conducting innovative research and disseminating this knowledge to myriad audiences, I-LABS will strengthen the ties between the science and the practice of early learning.

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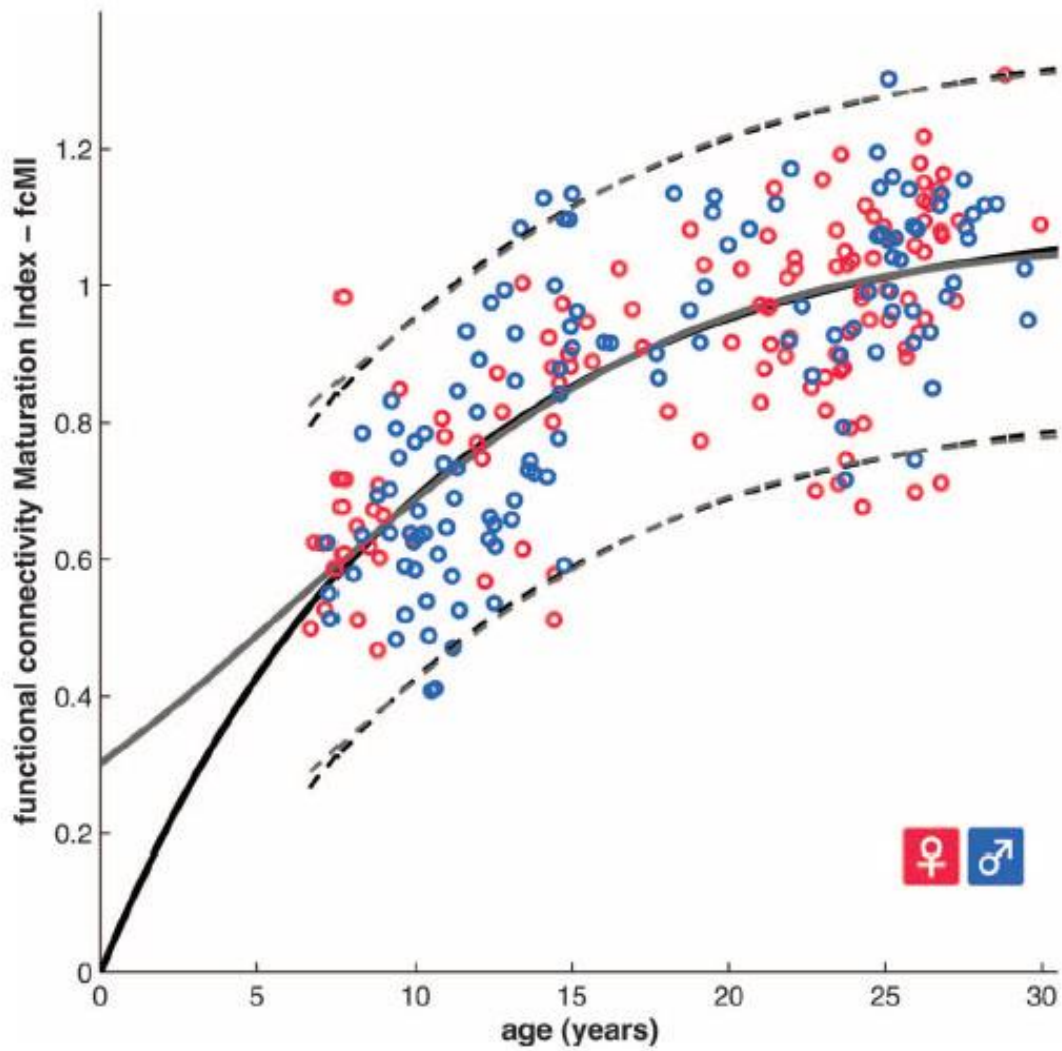
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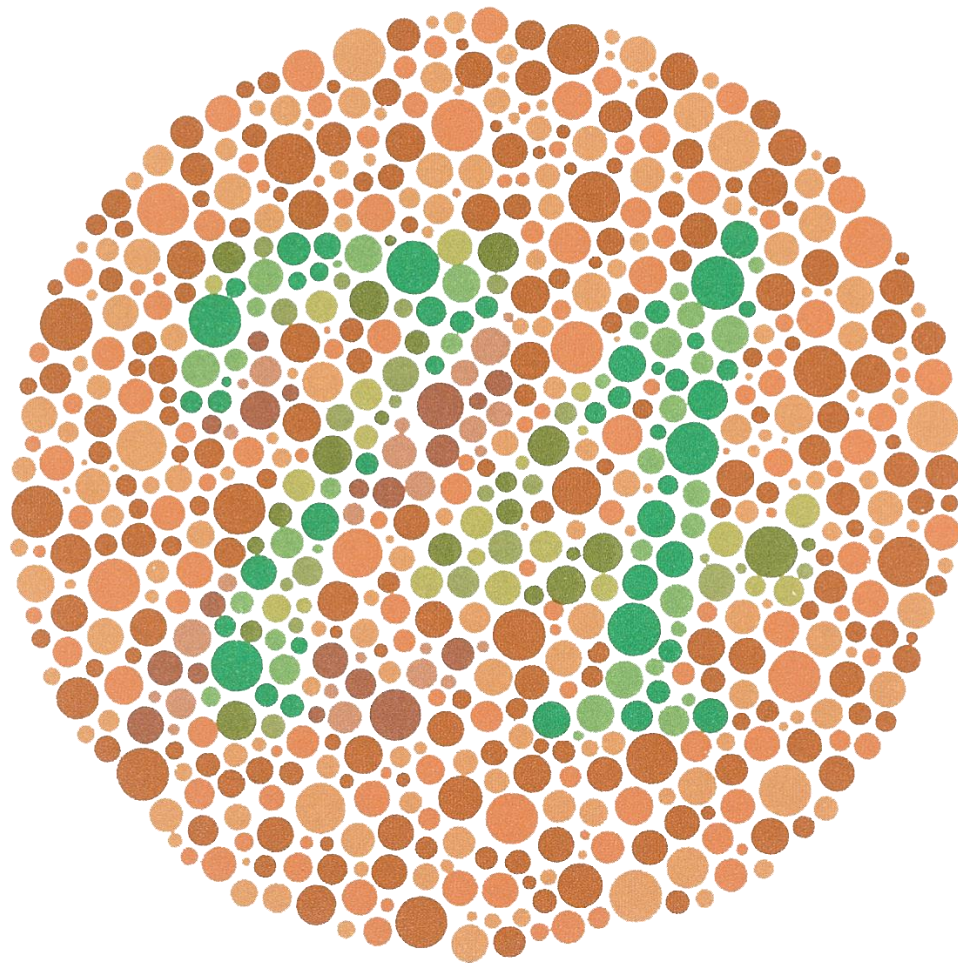
## The Relationship Between ADHD and Learning Disabilities

ADHD is not a learning disability; however, it does make learning difficult. For example, it is hard to learn when you struggle to focus on what your teacher is saying or when you can't seem to be able to sit down and pay attention to a book.



**Wondering what happened to your little princess? Blame it on the brain.**







# **Latitude-of-birth and season-of-birth effects on human color vision in the Arctic**





## Babies Can Learn Music in the Womb

By [NICHOLAS BAKALAR](#)

A new study suggests that babies can learn a melody they hear while still in the womb, and recognize it after they are born.

For the study, [published online last week by PLOS One](#), Finnish researchers divided 24 pregnant women into two groups. Five times a week, the “learning group” played a CD that included a one-minute rendition of “Twinkle Twinkle Little Star” The lead author, Eino Partanen, a researcher at the University of Helsinki, urged parents not to make too much of the finding. “A baby can be relaxed and soothed by melodies it hears before birth,” he said. “But there is no evidence that it will get your baby into Harvard.”

# Functional specializations for music processing in the human newborn brain

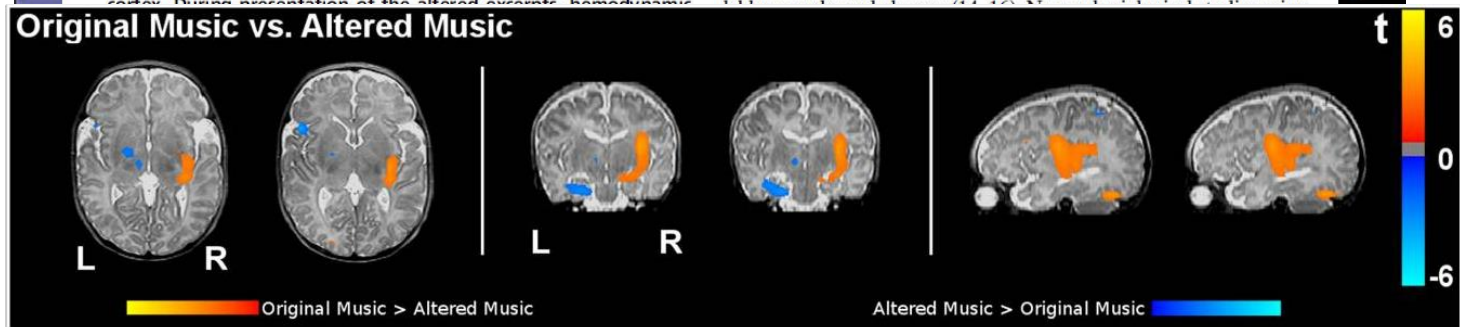
Daniela Perani<sup>a,b,c,d,1,2</sup>, Maria Cristina Saccuman<sup>a,b,1</sup>, Paola Scifo<sup>b,c,d</sup>, Danilo Spada<sup>e</sup>, Guido Andreolli<sup>a</sup>, Rosanna Rovelli<sup>f</sup>, Cristina Baldoli<sup>c,g</sup>, and Stefan Koelsch<sup>h,i</sup>

<sup>a</sup>Faculty of Psychology, Vita-Salute San Raffaele University, 20132 Milan, Italy; <sup>b</sup>Division of Neuroscience, San Raffaele Scientific Institute, 20132 Milan, Italy; <sup>c</sup>Center of Excellence for High-Field Magnetic Resonance Imaging (CERMAC), San Raffaele Scientific Institute, 20132 Milan, Italy; <sup>d</sup>Department of Nuclear Medicine, San Raffaele Scientific Institute, 20132 Milan, Italy; <sup>e</sup>Psychology Section, Department of Biomedical Sciences and Technologies, School of Medicine, Università degli Studi, 20134 Milan, Italy; <sup>f</sup>Department of Neonatology, San Raffaele Scientific Institute, 20132 Milan, Italy; <sup>g</sup>Department of Neuroradiology, San Raffaele Scientific Institute, 20132 Milan, Italy; <sup>h</sup>Cluster of Excellence "Languages of Emotion," Freie Universität Berlin, 14195 Berlin, Germany; and <sup>i</sup>Max-Planck-Institute for Human Cognitive and Brain Science, 04103 Leipzig, Germany

Edited\* by Dale Purves, Duke University Medical Center, Durham, NC, and approved January 26, 2010 (received for review August 28, 2009)

In adults, specific neural systems with right-hemispheric weighting are necessary to process pitch, melody, and harmony as well as structure and meaning emerging from musical sequences. It is not known to what extent the specialization of these systems results from long-term exposure to music or from neurobiological constraints. One way to address this question is to examine how these systems function at birth, when auditory experience is minimal. We used functional MRI to measure brain activity in 1- to 3-day-old newborns while they heard excerpts of Western tonal music and altered versions of the same excerpts. Altered versions either included changes of the tonal key or were permanently dissonant. Music evoked predominantly right-hemispheric activations in primary and higher order auditory cortex. During presentation of the altered excerpts, hemodynamic

emotional expression and meaning. Despite the complexity of such cognitive operations, mounting evidence indicates that newborns and young infants are highly sensitive to musical information. Music modulates infants' attention and arousal levels (10) and evokes pleasure or discomfort. Infants with casual exposure to music possess the abilities for relational processing of pitch and tempo; for the differentiation of consonant vs. dissonant intervals; and for the detection of variations in rhythm, meter, timbre, and tempo as well as duration of tones and musical phrases (12, 13). These musical competences of infants play a crucial role in early language learning, because the processing of speech prosody (e.g., speech melody, speech rhythm) provides important cues for the identification of syl-



# Early Music Lessons Have Longtime Benefits

By [PERRI KLASS, M.D.](#)



Joyce Hesselberth

# KÖRSÅNG





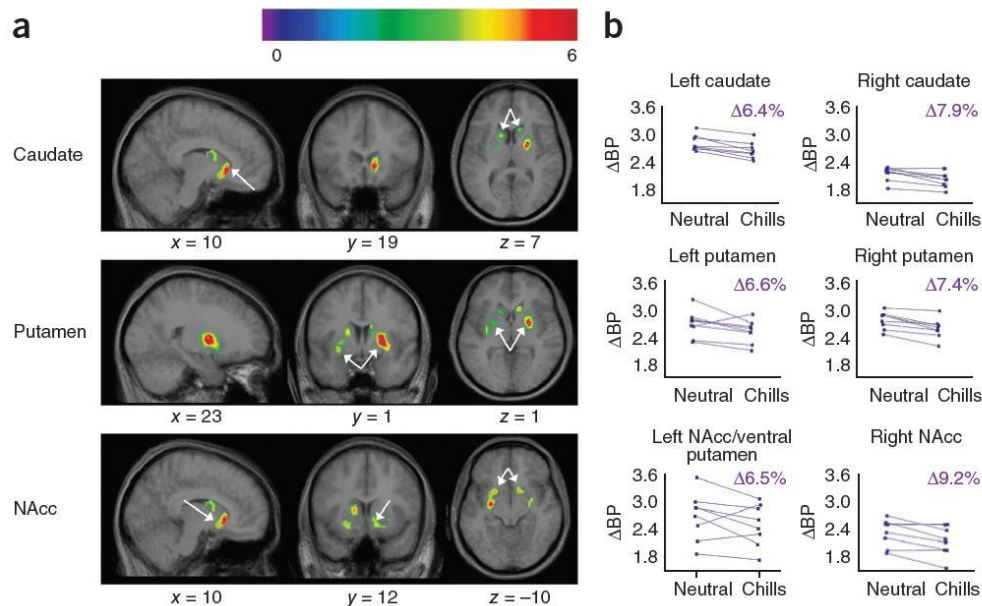
Music training and child development: a review of recent findings from a longitudinal study  
Assal Habibi, 1 Antonio Damasio,1 Beatriz Ilari,2 Matthew Elliott Sachs,1 and Hanna  
Damasio1

“Still, it is fair to conclude that our findings already suggest that music training plays a significant role in childhood development at both behavioral and neural levels and that these findings concern children from disadvantaged backgrounds who would normally not have access to music instruction”.

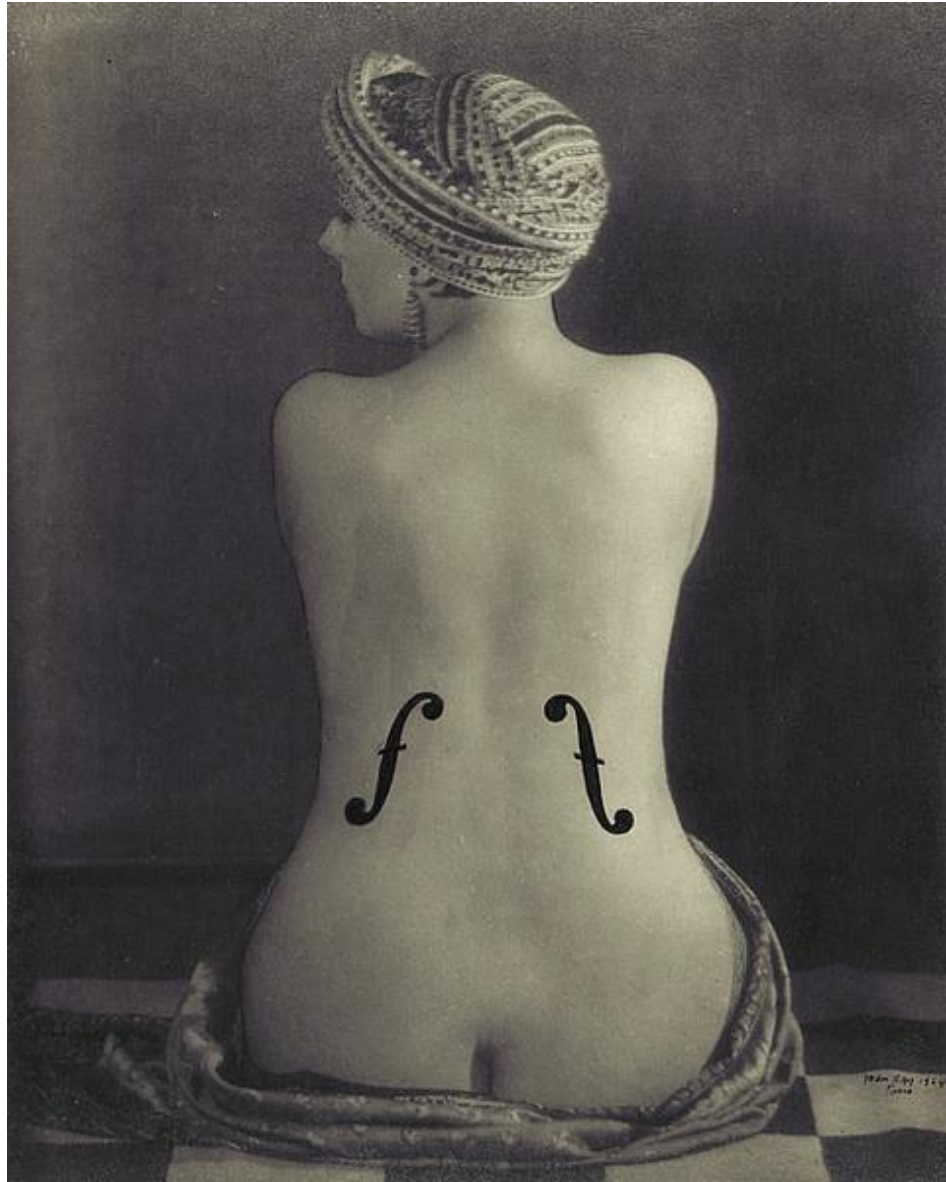


# Anatomically distinct dopamine release during anticipation and experience of peak emotion to music

Valorie N Salimpoor<sup>1-3</sup>, Mitchel Benovoy<sup>3,4</sup>, Kevin Larcher<sup>1</sup>, Alain Dagher<sup>1</sup> & Robert J Zatorre<sup>1-3</sup>



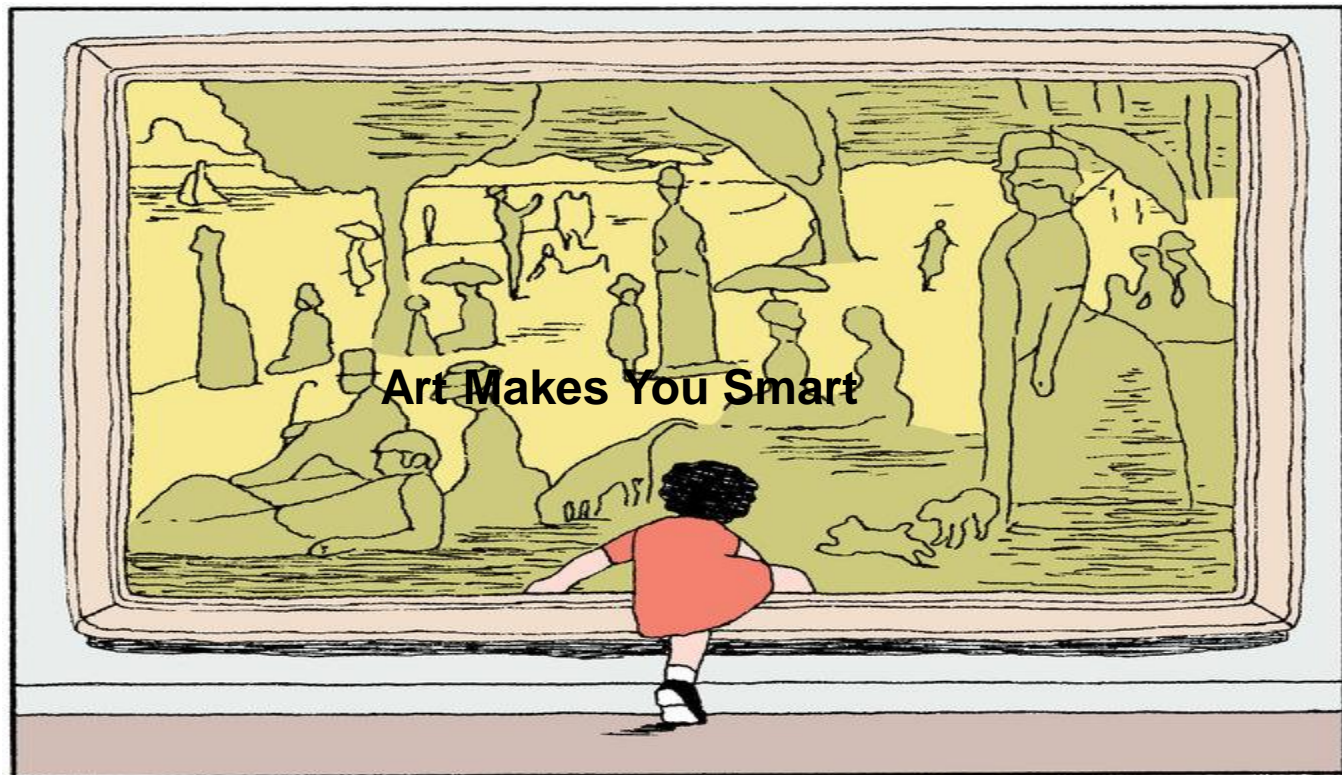
**Figure 2** Evidence for dopamine release during pleasurable music listening. **(a)** Statistical parametric maps (*t* statistic on sagittal, coronal and axial slices) reveal significant ( $P < 0.001$ ) [<sup>11</sup>C]raclopride binding potential (BP) decreases bilaterally in the caudate, putamen and NAcc (white arrows) during pleasurable compared with neutral music listening (**Supplementary Table 2**), indicating increased dopamine release during pleasurable music. **(b)** Changes in binding potential (BP) values plotted separately for each individual; note that the change was consistent for the majority of people at each site.



Man Ray, *Le Violon d'Ingres*, 1924



**A neuroscientist's lessons on why abstract art makes our brains hurt so good**



## Inspiring Stories Can Lead to Empathy

By Andrea Bennett on October 20, 2011 10:50 AM

A USC researcher has studied emotions such as compassion, admiration and inspiration.

These emotions may be linked to deeper levels of learning and a sense of self, according to assistant professor Mary Helen Immordino-Yang, who has a joint appointment at the USC Rossier School of Education and the Brain and Creativity Institute at the USC Dornsife College of Letters, Arts and Sciences, and graduate student Vanessa Singh.

The study suggests that we are able to be more compassionate toward others when we empathize with them on a psychological level, as opposed to a physical one. Put another way, we should try to understand people's mental anguish during a tragedy, not their physical pain.

"When we learn about other people's personal and emotional triumphs and tragedies, we appreciate them more. We understand them a little better, in part by relating them to our own experiences and memories," Immordino-Yang said.

The hippocampus is the part of the brain that organizes and stores memories. It also organizes the part of the system that allows us to learn from our behavior.

Immordino-Yang and her colleagues conducted brain imaging scans on participants.

The researchers found that participants who watched videos and expressed a desire to be more compassionate for social causes showed increased activity in the hippocampus.



Assistant professor Mary Helen Immordino-Yang conducted the study.

Photo/Steve Cohn

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# Hippocampal Contributions to the Processing of Social Emotions

Mary Helen Immordino-Yang,<sup>1,2,3\*</sup> and Vanessa Singh<sup>1</sup>

<sup>1</sup>Brain and Creativity Institute, University of Southern California, Los Angeles, California

<sup>2</sup>Rossier School of Education, University of Southern California, Los Angeles, California

<sup>3</sup>Neuroscience Graduate Program, University of Southern California, Los Angeles, California

## *Emotions, Learning, and the Brain: Exploring the Educational Implications of Affective Neuroscience*

Mary Helen Immordino-Yang,  
Foreword by Howard Gardner,  
Afterword by Antonio Damasio  
Hardcover, 208 pages, \$35.00

What are feelings, and how does the brain support them? What role do feelings play in the brain's learning process? This book unpacks these crucial questions and many more, including the neurobiological, developmental, and evolutionary origins of creativity, facts and myths about mirror neurons, and how the perspective of social and affective neuroscience can inform the design of learning technologies.

“Fasten your seatbelts and step into the fast lane of twenty-first century cognitive neuroscience, emotions, and learning. Mary Helen Immordino-Yang gets straight to the heart of the matter: how and why emotions matter in teaching and learning. *Emotions, Learning, and the Brain* is **the book we have all been waiting for: relevant, rigorous and, yes, revolutionary**. It is the book every teacher and parent, every policy maker and researcher, and every citizen concerned with the future of American education should read.”  
—**Marcelo M. Suarez-Orozco**, Wasserman Dean & Distinguished Professor of Education, UCLA Grad School of Education & Information Studies

Research Report

# The Cognitive Benefits of Interacting With Nature

Marc G. Berman,<sup>1,2</sup> John Jonides,<sup>1</sup> and Stephen Kaplan<sup>1,3</sup>

<sup>1</sup>Department of Psychology, <sup>2</sup>Department of Industrial and Operations Engineering, and <sup>3</sup>Department of Electrical Engineering and Computer Science, University of Michigan

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**ABSTRACT**—*We compare the restorative effects on cognitive functioning of interactions with natural versus urban environments. Attention restoration theory (ART) provides an analysis of the kinds of environments that lead to improvements in directed-attention abilities. Nature, which is filled with intriguing stimuli, modestly grabs attention in a bottom-up fashion, allowing top-down directed-attention abilities a chance to replenish. Unlike natural environments, urban environments are filled with stimulation that captures attention dramatically and additionally requires directed attention (e.g., to avoid being hit by a car), making them less restorative. We present two experiments that show that walking in nature or viewing pictures of nature can improve directed-attention abilities as measured with a backwards digit-span task and the Attention Network Task, thus validating attention restoration theory.*

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dated James' distinction between voluntary and involuntary attention both behaviorally (Fan, McCandliss, Fossella, Flombaum, & Posner, 2002; Jonides, 1981) and neurally (Buschman & Miller, 2007; Corbetta & Shulman, 2002; Fan, McCandliss, Sommer, Raz, & Posner, 2005). In addition to top-down control, directed attention<sup>1</sup> involves resolving conflict, when one needs to suppress distracting stimulation. ART identifies directed attention as the cognitive mechanism that is restored by interactions with nature.

We are not the first to propose a crucial role for directed attention in effective cognitive functioning. One of the main themes of Posner and Rothbart's recent *Annual Review of Psychology* chapter (2007) is this very topic: how directed attention plays a prominent role in successful cognitive and emotional functioning. Additionally, recent research has implicated an important role for directed attention in short-term memory (see Jonides et al., 2008) and school success (Diamond, Barnett, Thomas, & Munro, 2007).

Current Issue

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By 2050, two-thirds of the world's population will be living in cities. Although city living urbanization has major health implications — schizophrenia is more common in people living in heavily populated districts, and living in cities increases the rates of depression and anxiety, and social stress plays a part in these effects, but the mechanisms involved are unknown. Using functional magnetic resonance imaging, a key brain structure for negative emotion, the amygdala, is active during stress in city dwellers, and a regulatory brain area (the cingulate cortex) results identify potential mechanisms linking social environment and mental illness, at urban surroundings. Cover image: O. Dusegård/Getty.

NEWS & VIEWS

SOCIAL NEUROSCIENCE

Stress and the city

Many of us were raised or currently live in an urban environment. A neuroimaging study now reveals how this affects brain function when an individual is faced with a stressful situation. SEE LETTER P.498

DANIEL P. KENNEDY & RALPH ADOLPHS

The landscape of human society is changing drastically. In 1950, only 30% of the world's population lived in urban regions; today, more than 50% of us do so; by 2050, this figure is expected<sup>1</sup> to have climbed to almost 70% (Fig. 1). And, just as social isolation is well known to have harmful effects<sup>2</sup>, so does the opposite extreme: overcrowding can induce stress and illness in species ranging from insects to rodents<sup>3</sup> to primates, including humans<sup>4</sup>. In particular, mental illness in humans has been linked to the urban environment: living in a city increases the risk of depression and anxiety, and the rate of schizophrenia is markedly higher in people born and brought up in cities<sup>5</sup>. Writing on page 498 of this issue, Lederbogen *et al.*<sup>6</sup> use functional magnetic resonance imaging to investigate for the first time the specific human brain structures that are affected by urban living.

The study's participants lived or had lived in locations ranging from rural areas to large cities (Fig. 2). The authors measured regional brain activation while participants performed a social-stress test — solving hard arithmetic problems under time pressure and with negative feedback from the experimenter. This task not only increased the participants'

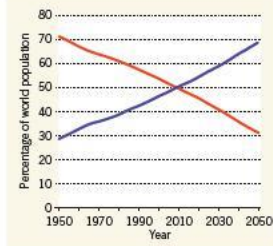


Figure 1 | The city allure. The percentage of the global population living in urban (blue) and rural (red) regions since 1950, with projected<sup>1</sup> figures up to 2050.

heart rate, blood pressure and salivary levels of the stress-associated hormone cortisol, but also resulted in significant activity in brain structures known to be involved in emotion and stress.

Of the activated brain regions, two were of particular interest: activation in the amygdala correlated with the size of the city in which an individual currently resided, and activation of the perigenual anterior cingulate cortex (pACC) correlated with how long a participant

had lived in a large city during their childhood. Urban upbringing also affected the strength of the functional coupling between the amygdala and the pACC: those who had spent more time growing up in large cities had reduced functional connectivity between these two regions.

Intriguingly, a similar pattern of reduced amygdala–pACC coupling has previously been associated<sup>7</sup> with genetic risk for psychiatric disorders, and the amygdala has recently been linked both to social-network size<sup>8</sup> and to the sense of personal-space violation<sup>9</sup>. Taken together, the findings suggest that the cingulate–amygdala circuit is one on which genetic and environmental risks for mental illness may converge.

The sheer number and complexity of the factors involved in studies of real-world society raise concerns about both the reliability of effects and the possibility of confounding explanations. To address the first of these concerns, Lederbogen *et al.*<sup>6</sup> replicated their findings in several separate samples, used two different stress-inducing tasks, and demonstrated that there were no effects of urbanicity on brain activation when participants performed a non-stressful cognitive task.

The second concern — that urbanicity may be confounded by other variables associated with but causally separable from it — is difficult to address, given the enormous



Figure 2 | Regional categories. In their study<sup>6</sup>, Lederbogen *et al.* categorized living conditions as those associated with rural areas (a), towns with more than 10,000 inhabitants (b) and cities with more than 100,000 inhabitants (c). Their data suggest that city living affects the brain's response to stress.



# How Walking in Nature Changes the Brain

By

[Gretchen Reynolds](#)

July 22, 2015 5:44 am July 22, 2015 5:44 am 392 Comments



## Neuroscience and Architecture: Seeking Common Ground

Esther M. Sternberg<sup>1,\*</sup> and Matthew A. Wilson<sup>2,\*</sup>

<sup>1</sup>Integrative Neural Immune Program, National Institute of Mental Health, National Institutes of Health, Bethesda, MD 20892, USA

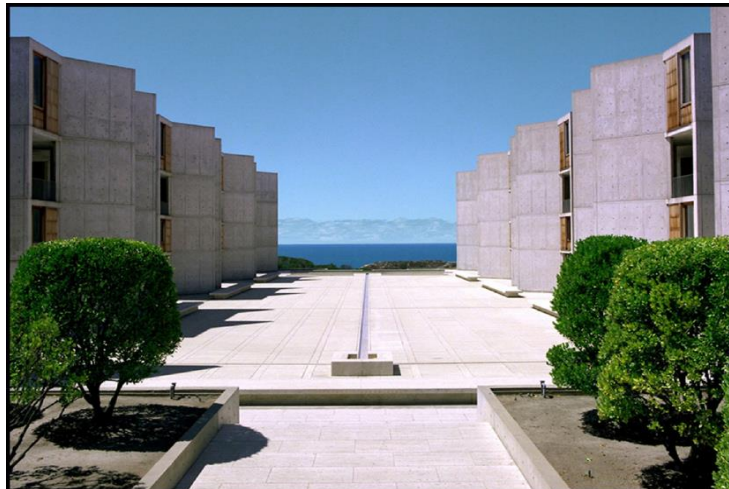
<sup>2</sup>Picower Institute for Learning and Memory, Departments of Brain and Cognitive Sciences and Biology, Massachusetts Institute of Technology, Cambridge, MA 02139, USA

\*Contact: sternbee@mail.nih.gov, mwilson@mit.edu

DOI 10.1016/j.cell.2008.10.012

As these paired Commentaries discuss, neuroscientists and architects are just beginning to collaborate, each bringing what they know about their respective fields to the task of improving the environment of research buildings and laboratories.

## Can Architecture Enhance Creativity?



**Left:** Photo courtesy of the Salk Institute for Biological Studies. Jonas Salk worked with the master architect Louis Kahn to design the Salk Institute as a research Center.

**Right:** Photo by Andy Ryan/courtesy of MIT's Stata Center for Computer, Information, and Intelligence Sciences, designed by Frank Gehry.



**Bringing the Brain Back into Medicine**

Tanke, vars strider blott natten ser!  
Toner, hos eder om vila den ber.  
Hjärta, som lider av dagens gny!  
Toner, till eder, till er vill det fly.



“Art washes away from the soul the dust of everyday life,” so Pablo Picasso once famously proclaimed

“Music washes away.....”  
Berthold Auerbach

All-Party Parliamentary Group on Arts, Health and  
Wellbeing Inquiry Report Creative Health:  
The Arts for Health and Wellbeing

July 2017

# SoundHealth An NIH-Kennedy Center Initiative to Explore Music and the Mind

Francis S.Collins, MD,PhD;  
Renée Fleming, MM

# Music-based interventions in neurological rehabilitation

Alexi J Sihvonen, Teppo  
Särkämö, Vera Leo, Mari  
Tervaniemi, Eckart Altenmüller,  
Seppo Soynila



[Emotion](#). 2019 Feb 28. doi: 10.1037/emo0000573. [Epub ahead of print]

### **Why do depressed people prefer sad music?**

[Yoon S](#)<sup>1</sup>, [Verona E](#)<sup>1</sup>, [Schlauch R](#)<sup>1</sup>, [Schneider S](#)<sup>1</sup>, [Rottenberg J](#)<sup>1</sup>.

#### **Author information**

#### **Abstract**

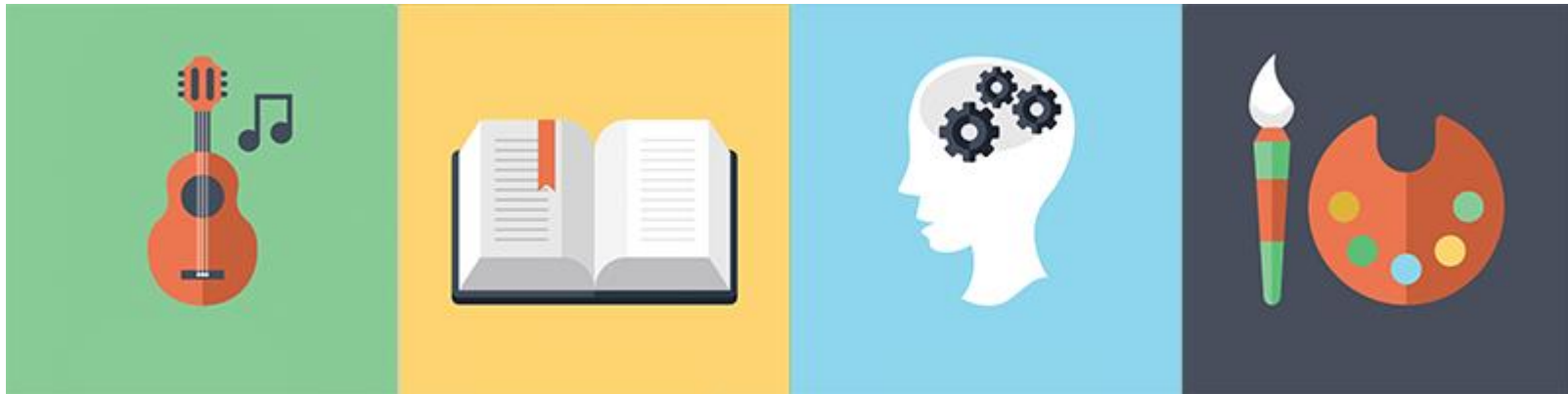
One of the cardinal symptoms of major depressive disorder (MDD) is persistent sadness. Do people with MDD actually prefer sad stimuli, potentially perpetuating their depression? Millgram, Joormann, Huppert, and Tamir (2015) observed such preferences and interpreted them as reflecting a maladaptive emotion regulatory goal to upregulate sad feelings. We assessed emotional music choice among both those with MDD and healthy controls (HC), and assessed the reasons for music preferences in these two groups. However, inconsistent with any motivation to upregulate sadness, people with MDD reported that they chose sad music because it was low in energy levels (e.g., relaxing). EMST results revealed that MDD people had a stronger preference for both low energy and sad music, relative to HC. The strong appeal of sad music to people with MDD may be related to its calming effects rather than any desire to increase or maintain sad feelings. (PsycINFO Database Record (c) 2019 APA, all rights reserved).

## **Creating Harmony: How Music Can Support Social Emotional Development**

# Art, Music, and the Brain: How the Arts Influence Us

- Published 16 Feb 2017
- Reviewed 16 Feb 2017
- Author
- Source BrainFacts/SfN

Early education in music and art can have major impacts on the brain, strengthening key areas and providing lasting health benefits. But for many, access to quality arts education is out of reach. In this panel from Neuroscience 2016, experts describe how art affects the brain, how those effects can be harnessed for public health, and how to create universally accessible arts education for young people. Click on the icons in the image to navigate through the video series.



# meet me

The MoMA Alzheimer's Project:  
Making Art Accessible to People  
with Dementia



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### Research the Project

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### Share the experience

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### Explore topics in art

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# Music as an Adjunct to Opioid-Based Analgesia

This manuscript describes the neurologic mechanism of action, theoretical basis, and potential applications of personalized music as a smartphone-based mHealth intervention for acute and chronic pain management.

BRAIN BIOLOGY

# THE NEUROSCIENCE OF *Dance*

Recent brain-imaging studies reveal some of the complex neural choreography behind our ability to dance



By Steven Brown and Lawrence M. Parsons



## KEY CONCEPTS

- Dance is a fundamental form of human expression that likely evolved together with music as a way of generating rhythm.
- It requires specialized mental

**S**o natural is our capacity for rhythm that most of us take it for granted: when we hear music, we tap our feet to the beat or rock and sway, often unaware that we are even moving. But this instinct is, for all intents and purposes, an evolutionary novelty among humans. Nothing comparable occurs in other mammals nor probably elsewhere in the

though space? How do they pace their steps? How do people learn complex series of patterned movements? The results offer an intriguing glimpse into the complicated mental coordination required to execute even the most basic dance steps.

**I Got Rhythm**

## Brain burdens

Europe's shocking statistics on neurological and mental disorders demand a shift in priorities.

Research to combat diseases, one would think, would be in proportion to the burden inflicted on the population. Reality is very different — witness the disparity between the huge burden caused by diseases in the developing world and the resources for research to tackle them.

Another disparity exists, and it is universal: the significant burden of mental and neurological illnesses of the human brain compared with the small proportion of research funds available to understand and treat them. Unlike cardiovascular disease and cancer, in cases the burdens of brain disorders tend to manifest themselves as disabilities and in effects on the lives of the people afflicted and carers, rather than in early deaths. That makes the footprint of conditions harder to quantify.

So it is particularly valuable that a group of brain specialists and statisticians has produced a new quantification of the burden of brain disorders across 30 European countries. Building on a previous study, they assessed more disorders, analysed the literature and consulted national experts to validate emerging perspectives. The result? A

Many more men than women have alcohol-use disorders, especially in Eastern Europe; for both dementia and unipolar depression, the ratios of women to men are around two to one. The reasons for these latter gender differences are not understood, although depression among women seems to arise especially during their child-bearing years. The estimated number of people affected by major depression in the 30 countries studied is 30 million — the single greatest burden of all human diseases.

But understanding how neural circuits develop in the young, and how environmental and innate influences combine to disrupt them, is one of the most fascinating and difficult scientific challenges of our time. The new study re-emphasizes just how urgent it is.

brain diseases in which the prevalence in ageing populations will inevitably increase, such as Alzheimer's, but also the brains of young people, both healthy and ill. Many mental disorders emerge or begin to develop in the first two decades of life. Our knowledge of the healthy adolescent brain — a stage of still-active neural development — is rudimentary.

mental ill health (*Nature* 477, 132 and 478, 15; 2011) would be to boost 'resilience' to mood disorders.

Mentally healthy individuals often show a positive affective bias because their processing of negative information is inhibited. This effect, possibly mediated by the neuromodulator serotonin, promotes resilience by dampening the stress associated with negative life experiences.

Devising ways to promote such resilience in healthy individuals could help to prevent chronic stress-related brain disorders, saving huge amounts of money and heartache every year. **Oliver J. Robinson** *National Institute of Mental Health, Bethesda, Maryland, USA.* [robinsonoj@mail.nih.gov](mailto:robinsonoj@mail.nih.gov)

**Disclaimer:** Views presented in this Correspondence are solely those of the author and do not necessarily represent the views of the US federal government.

MENTAL HEALTH

# Trillion-dollar brain drain

Enormous costs of mental health problems in Europe not matched by research investment.

BY KERRI SMITH

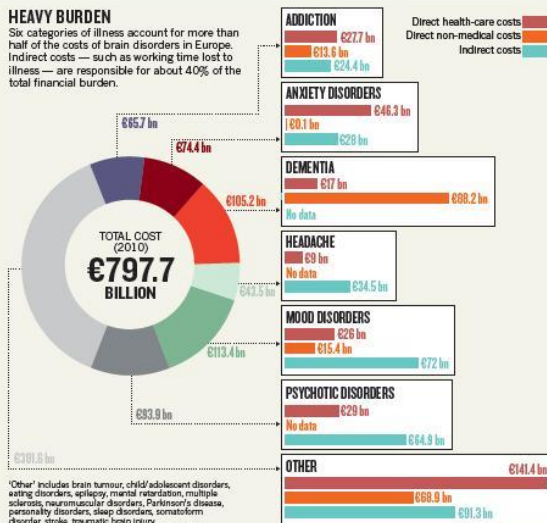
Brain disorders cost Europe almost €800 billion (US\$1 trillion) a year — more than cancer, cardiovascular disease and diabetes put together. That's the conclusion of a report<sup>1</sup> commissioned by the European Brain Council that provides the most comprehensive assessment of the financial consequences of mental ailments so far.

The report's authors argue that these enormous costs — which exceed the entire gross domestic product of the Netherlands — mean that research into brain disorders receives disproportionately little funding compared with other diseases. They call on politicians and funders to step up support for basic research on these conditions, which are so costly because they often require long-term care and erode the productivity of those affected for years or decades.

The report is an update of a similar survey in 2005, which found that brain disorders were costing Europe €386 billion<sup>2</sup>. Since then, Bulgaria and Romania have joined the European Union and seven more categories of disorder have been added to the assessment, including eating disorders, sleep disorders, mental retardation, and childhood and developmental disorders such as autism. The authors say that their new estimate, although double the

### HEAVY BURDEN

Six categories of illness account for more than half of the costs of brain disorders in Europe. Indirect costs — such as working time lost to illness — are responsible for about 40% of the total financial burden.



## Boost resilience to tackle mental illness

An economically efficient way of tackling the enormous social and economic costs of



E. MARCH/CORBIS

Understanding why loneliness can spread through society like a disease is a key question

## RESEARCH POLICY

## Social science lines up its biggest challenges

*'Top ten' crucial questions set research priorities for the field.*

BY JIM GILES

**H**ow can we persuade people to look after their health? Why do moods spread like a contagion? How can humanity increase its collective wisdom?

These are some of the most pressing ques-

a quantitative way, addressing problems from equality and wages to wars and health.

The 'top ten' approach was inspired by a list of 23 major unsolved questions compiled by the mathematician David Hilbert in 1900. The Hilbert problems helped to focus the attention of mathematicians throughout the following

**H**ow can we persuade people to look after their health? Why do moods spread like a contagion? How can humanity increase its collective wisdom?

submitted by members of the public.

At the symposium, Emily Oster, an economist at the University of Chicago, Illinois, focused on a perennial challenge for public-health experts: how to get people to adopt healthier behaviours. For instance, persuading people to eat less and exercise more — to control ballooning obesity



## Violent Video Games and Aggression

Lauren Goldbeck and Alex Pew, National Center for Health Research

After mass shootings, the media and public officials often question the role of the shooter's video game habits.

The American Psychological Association (APA) considers violent video games a risk factor for aggression.<sup>[1]</sup> In 2017, the APA Task Force on Violent Media concluded that violent video game exposure was linked to increased aggressive behaviors, thoughts, and emotions, as well as decreased empathy. However, it is not clear whether violent video game exposure was linked to criminality or delinquency.

•When you're smilin', when you're smilin'  
The whole world smiles with you  
When you're laughin', when you're laughin'  
The sun comes shinin' through

But when you're cryin', you bring on the rain  
So stop your sighin', be happy again  
Keep on smilin', 'cause when you're smilin'  
The whole world smiles with you

**NEUROSCIENCE**

# Use it or lose it

*Nature Neurosci.* doi:10.1038/nn.2498 (2010)

The making of new memories can interfere with old memories of similar events.

However, elevated activity in the brain's hippocampus during new memory formation is associated with the retention of older, related memories, according to work by Brice Kuhl, Anthony Wagner and their team at Stanford University in California.

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*MEMENTO  
VIVERE*

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## Den kulturella hjärnan

Evidensen blir allt starkare, och publiceras nu i de solidaste av vetenskapliga tidskrifter: Kultur stärker både hälsa och lärande!

Musik man gillar förbättrar återhämtningen efter stroke.

Dans hejdar och lindrar problemen vid Parkinsons sjukdom

Musik lindrar smärta.

Mångsidig stimulans av hjärnan underlättar inlärning

Att själv musicera förbättrar arbetsminne, och därmed förmågan att lära sig olika saker

Läs mer på [www.culturalbrain.se](http://www.culturalbrain.se)  
[www.kulturellahjarnan.se](http://www.kulturellahjarnan.se)