

"Music's influence on brain"

by Dr. Rosanna Galdi

Introduction. Music etymologically comes from the ancient Greek (μουσική) which means the “Art of Muses”, as its relaxing and calming effect has been acknowledged since the dawn of times.

In fact, music is the core communication channel of interiority, namely a series of emotions, perceptions, recalls that every human being decides to share with their similar.

Music is an emphatic channel too, where affective sensations and human feelings may stimulate recalls and revivals.

This abstract is focused on positive effects of music on brain. The early, first contact of any individual with music occurs during his intrauterine life, by listening to his mum’s voice, an unforgettable sound that recalls positive sensations and vibrations.

Any child should be encouraged to play an instrument, since early age, when the lateralization process of brain is not fully completed, until the 15-16 years. The specialization of hemispheres in fact is one of the last processes of brain development, because any human being for genetic, ambience, or casual influence can specialize one or more attitudes leaded by left or right hemisphere.

For this reason, the art of music is as successful as earlier a child is initiated to a propedeutic to a musical instrument, preferably at age of 9, although in a greater measure school and family plays an important role in encouraging his performance.

Attention and memory are cognitive skills that are first implied in a positive attitude towards learning to play an instrument, while listening to music is an unconscious and innate attitude that any human being has and it can be exempted if properly “nourished” by exercise and practice.

Recent studies have highlighted the importance of music on pathologic “brain”. In fact, its beneficial and positive effects stimulate relaxation hormones, by delaying the negative impulses on brain from fatal pathologies such as Parkinson, Alzheimer. It even prevents the psychotic effects of autism in children, by encouraging socialization and communication in classroom and with friends.

The recalling stimulus acts on nervous central system and it activates the memory neurons, enchainning a series of neurotransmitters that enhance mechanical and automatic systems to produce relaxing and positive effects on the whole organism.

This article aims at describing the organic and cognitive mechanisms by a compulsory of extracts the author has managed to systematically rearrange, (even not attaining to the health care in a proper way), and how the awakening of senses may positively influence those “critical” brain pathologies and convert them into a wider wellness and satisfying perceptions. It has been proven in fact that “music memory” enhances a sort of stimuli, even affecting senses, that can delay the brain detriment in patients naturally predisposed to brain pathologies because of genetic, ambience, or physical influence. Real musicians pathologies in the past may prove that the sections of brain like amygdale and cerebellum once seriously compromised, affect music and language perceptions.

Furthermore, the way by which composers, songwriters can potentiate and amplify their music creativity is very stunning, especially in the lack of whole or partly of cognitive functions.

For this reason this article is worthy to be deeply studied and the issues that are mentioned further analyzed from a scientific point of view.

Both language and music forehead the left hemisphere, the progressive declining or incorrect development of which may even deteriorate all those mechanisms which direct communication tasks.

ABSTRACT. The ancient Greece already knew the importance of music. Music has been scientifically proven to provoke changes in the brain. Music invests the brain as "a whole", by activating different impulse on the electro-chemical action of the brain. The brain directs and coordinates any body movements. The human brain can operate simultaneously, by juxtaposition, in parallel. The brain is a mutable dynamic

network. There are three factors that contribute to this mutation: 1) genetics; 2) ambience 3) causality. Fiber myelination occurs at around 15-16 years and it completes its development at around 20-24 years. There are some elementary abilities that brain unconsciously develops: attention, perception, memory, reasoning, language. What kind of importance does learning music assume since the early childhood? Music "awakens" an enormous variety of senses and perceptions which act on musical memories of each individual. At any learning of a piece of music there are 3 areas that develop: musical memory, visual memory, and muscle memory. All this musical exercise (scientifically ascertained) causes a different development of the brain. It means areas which develop in any child some intelligence and greater abilities. Hence, the most musically endowed children have been early initiated to music by parents who let them listening to music or living music as protagonists. The starting musical background is very important. The propedeutic to music learning is a crucial point as it stimulates totally listening, sharing music, socialization. All these activities have a special purpose, much more precociously they start on. From 0 to 3 years with parents, from 3 to 10 in group. The initiation to any musical instrument should even happen by 9 years. "Neuro-musicology, a discipline that correlates scientific research on music with the human nervous system, attempts at identifying those brain areas involved into music process and understand the neurocognitive mechanisms which subtend listening and musical practice. How might the great motor-expressive capacities be potentiated by musicians? Why is anyone better than another one? Why does anyone learn before others? What are the mental processes that imply the abilities to rearrange a musical extract by voice or by fingers? Understanding how the "orchestra of neurons" analyses the musical information, directs the motor response and inheres to emotional reaction can allow the musician to better recognize his own potentials and to schedule and adapt more precisely his pedagogic methods. Hereto, the study of music not only exercises a social and pedagogical value (already recognized by great philosophers such as Plato and Aristotle), but also by engaging any brain area currently identified it manages to exert its role on the cognitive functions particularly linked to the memory, attention and space sensitive areas. Studying an instrument therefore, has a musical purpose in the strict sense, but the educational impact goes far beyond the technical aspect. Not all the boys who study music will make it a profession, but all those who have practiced it, especially if as a child, will learn to love a great art and to engage with passion, joy and seriousness in the many activities of their life ". **Angela Chiofalo pianist**

Information passes to the brain through neurons. There is an electrochemical game. There are various types of memory: genetic, immune and neuronal. Action is taken on memory, which can be short term and long term memory and which implies the mechanisms of learning. Procedural memory leads to motor skills. The organism is attracted by information of interest. Implicit memory is stored in the cerebellum, striatum, and amygdale. Music "involves" senses from a different perspective. Where do the musical memories go? At any learning of a piece of music there are 3 areas that develop: musical memory, visual memory, and muscle memory. There are teaching strategies for controlling the musician's performance anxiety. **Choking**: this is the name by which experts call the drop in performance due to emotional tension. Performance anxiety is a disorder that consists of an excessive concern to cope with a very important rehearsal, in front of other people. "Surveying on neurons mirror implies a scientific explanation to what empirically, the great masters have always taught us". The discovery of *mirror neurons* allows for the first time an objective, cerebral feedback on some things that previously were only subjective or measurable things from the eye of the connoisseur and the master. Let's start to pursue scientific grounds for art and learning. Neuhaus, the most famous piano teacher of the Soviet Union, thus, introduced "the *Art of piano*": " before being initiated to studying any instrument, any student may spiritually hold a musical heritage; it must preserve music, so to speak, in his own memory and in his heart, after having heard it by his own ear. The secret of the talented musician lays on the fact that music is a living matter in his brain just before he touches a taste or a string". Nowadays, scientists agree by saying that more a child lives in a musical ambience and he is absorbed into his everyday musical practice with a consequent activation of mirror neurons, more his learning will be simplified. The empathy aspect, however, confirms being the most revolutionary stadium of mirror neurons excitement, and their discovery impels the identification of correlations between cognitive and emotional activity. Neurodidactics, means just to talking about, the possibility to coordinate learning through cerebral systems implying more directly the emotional stadia and less directly the non emotional ones. Amazingly,

perception and action are both linked processes which allow us to overwhelm the secular division between the part of the brain which "do things" from that " which knows things", between action and semantics. As Merlau-Ponty had already pointed out, the empathic identification lies on the ground of perception, emotional, affective, immediate correlation between the other's body. The other's action motivates those exchange of proposals and gestures which are intentionally undermined between who notices and who is being noticed: "It's just as intentions might cohabit my body and mine in his..." Neuroscience even in this case, helps us to explain and code the Master figure in an emotional sense and not only as cultural handler, in a meaningful sense: enter an emphatic relationship with our student means give him the higher cognitive possibility. **Mario Cacciavillani Neurologist and Angela Chiofalo pianist.**

The physical approach to music did not exist years ago. The study of an instrument or vocal practice was immediately begun, ignoring that the child could develop a different attitude from the starting one. Now, with the work that is done before the study of an instrument, work that develops all the cognitive abilities of the child, the teacher can better direct the student managing to perceive more precisely at the end of a playful but challenging and done path of rules, what are its natural attitudes in relation to the study of a musical instrument. There may be cases where the student cannot withdraw his abilities for the piano, but he shows out his qualities for singing. There may be cases of students who can approach with group, but they can approach shyly as solo artist. Hence, the great pros of this preliminary preparation to study of an instrument consists on the fact of going without fail. As the child in that arch of time was able to freely express himself both alone and in the group. Vivifying the approach of children, interests overall the language perspective, from the aspect of movement and psychomotor and socialization. I looked my students through my eyes, who are from 0 to 10, and I perceived their amusement of reading and improving their culture through music. Pupils who also had little language pronunciation problems, have overcome them by constantly attending their lessons. The same rule applies to the psychomotor and motor aspect. Likewise, any child who fails putting their own foot on the floor and keeps on not to anchor it perfectly, or he cannot walk on well, to jump, or to run, will never manage it until he doesn't approach on it firmly. They are therefore totally converted as a main support of the children propedeutic of music, until the age of 9, which is considered the most suitable age to let child to approach to any musical instrument. Music is a unique cerebral mechanism. The most recent studies show scientifically that those who have studied music during their lifetime present an occurrence of Alzheimer disease almost nothing compared to those who have never approached musical studies. This is because the brain areas are continuously sprayed when the language is constantly exercised. Let's talk about reading musical language.

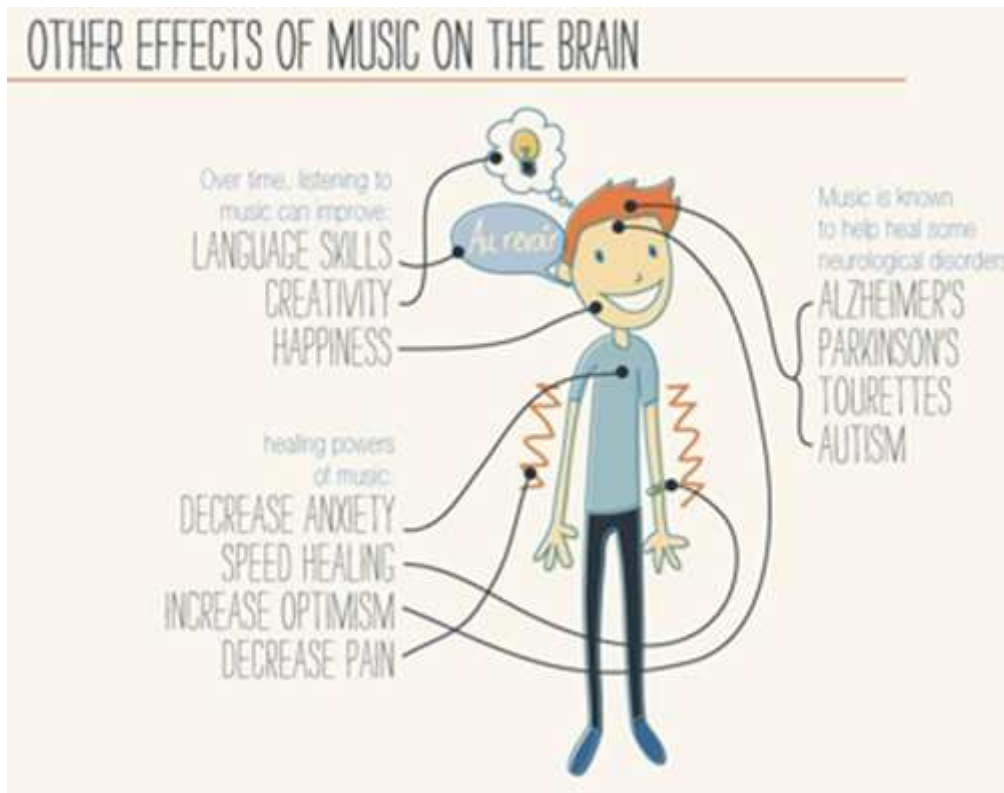


Figure 1. This image shows the beneficial effects that listening to music provokes on brain, by improving positive sensations as happiness, creativity and language skills and by lowering the risk of cognitive diseases such as Alzheimer, Parkinson and autism.

If we think that simply smelling a citrus-scented floor triggers a cerebral mechanism with the involvement of certain sensations and consequently it is stimulated to work better, we can easily understand which importance music covers in the everyday living life, as the first thing by which we are put in contact with is our mother's voice (sound) and her body perfume. These two aspects ground on the new-born development, by giving him security as he keeps on staying in his mother's womb. Mum's swaddling fragrance ensures a very deep interrelationship, as well as her voice. Neurologists have confirmed to us that musical memory begins before logical memory. This means that children since nursery schools, primary schools get accustomed to listen, to perceive beauty, then they will grow up better, as in that phase children are receptive and getting used to the richness of language.

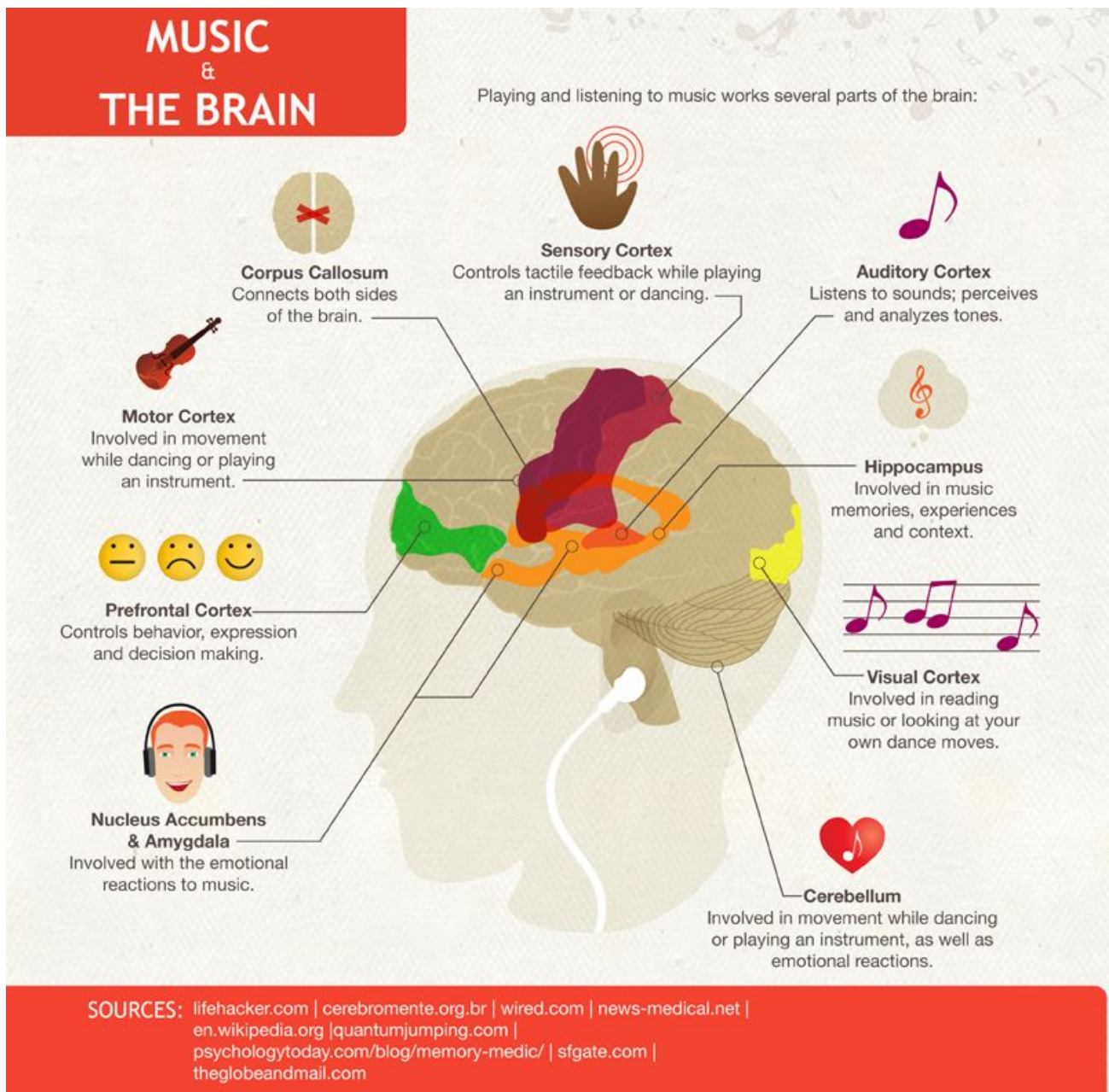


Figure 2. The electro-mechanical mechanisms besetting the musical stimuli and the parts of brain which are involved.

Music therapy is good even after surgery.

Chopin, Beethoven, Bach but also Luciano Pavarotti, the Beatles and the Pink Floyd or just a simple song or a melody: listening to music does good and its beneficial effects have been acknowledged for ages, starting from those on mother's womb. It is not such a case that music-therapy is worldwide recognized even from the scientific world as a "non-verbal communication instrument *par excellence*, capable of intervening not only at educational, rehabilitative or therapeutic level, into a variety of pathologic and para- physiological conditions".

Both **sound and music may foster communication channels in the inner world**, by encouraging the detecting of emotions in a series of situations; including intervention areas of neurology and psychiatry, the health care and the autism recovery, the mental delay, Alzheimer diseases and other pathologies, Parkinson mobs, until some psychoses such as mood disorders, the nervous anorexia and other syndromes of chronic pain.

But there's more than this. A recent metanalysis (namely the revision and the analysis of more scientific studies), just appeared on the precious reviews *The Lancet* and which has involved 7000 patients studied in 72 trials, it suggests moreover another music-therapy application field, the post-surgical period, which includes that balmy phase of the surgical intervention recovery. Postoperative convalescence disguises better in adult patients undergone to different surgical procedures (except those working on central nervous system or head and neck), just thanks listening to music. with excellent results.

The metanalysis, fruit of some English surveyors, from Brunel University and Queen University of London, has been focused on just surgery adult patients, compared to those recovered from not pharmacological approaches (such as massages and relaxing techniques). The music proposed before, during (therefore when the patients were under general anesthesia) and after the operation, reduced postoperative pain, anxiety and the use of painkillers, increasing patient satisfaction, while it did not affect the duration of the hospitalization. The greatest effect would be that of the music listened to before the intervention and especially when the patient is awake and aware.

According Catherine Meads, who has coordinated the English study, this kind of approach would be particularly appreciated in surgical field, since that every year more than 51 millions of interventions have been executed in USA and 46 millions in England. Music is a non-invasive, safe and economical method to make available to all patients leaving the operating room. To increase the beneficial effects it could be the patient himself to choose his favorite music, which in any case must never interfere with the communication between doctor and patient.

Summarily, music-therapy has intensively been supporting health-care therapy (if not considered the recovery), which is capable to improve and lower the behavior discrepancies. Beware, however! According to the World Federation of Music Therapy, music-therapy must be managed just by a qualified music-therapist, as professionally trained, namely musicians back grounded in pedagogy and music psychology, closely in contact with medical staff.

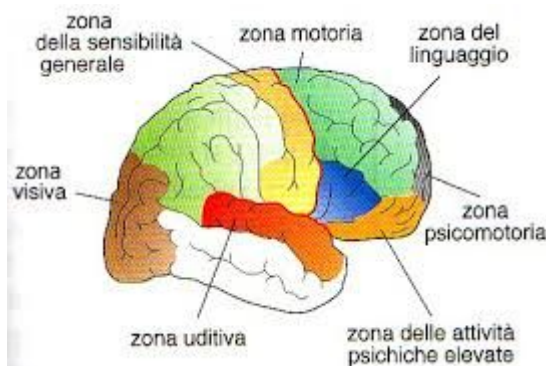


Figure 3. The different areas implied in motor and acoustic sensations.

Pop music is also useful for recovering memory from a brain trauma.

Who knows what the icons of world pop such as a Lady Gaga or Madonna would have thought of the scientific study conducted by the University of Lille and the University of Newcastle in Australia and published in the journal *Neuropsychological Rehabilitation*. The purpose of scientific research was to verify the benefits of listening to pop music to recover memory after a trauma. The researchers analyzed the cases of five people with different brain injuries, then comparing the results obtained with those of five healthy people. Ten subjects were asked to listen to some songs, carefully chosen among those which more "weighted" in everyone's life, and then they were asked which kind of reminds that listening recalled upon their mind (a dearest person, a particular place, an episode...) Researchers concluded by comparing the same remind for both listening groups, how deeper music exercised an effective input for people affected from amnesia in order to recover the lost memory.



Figure 4. Music helps people to recover themselves after a surgery.

- Search for: University of Lille, University of Newcastle
- Published on: Neuropsychological Rehabilitation.
- Conclusion: Therapeutic pop music for people with amnesia

Mozart and Strauss lower blood pressure and heart rate

This is supported by a study of University of Ruhr which confirmed that music in general exercises a "calming" effect upon blood circulation even compared the different suggestions between classic music and pop music.

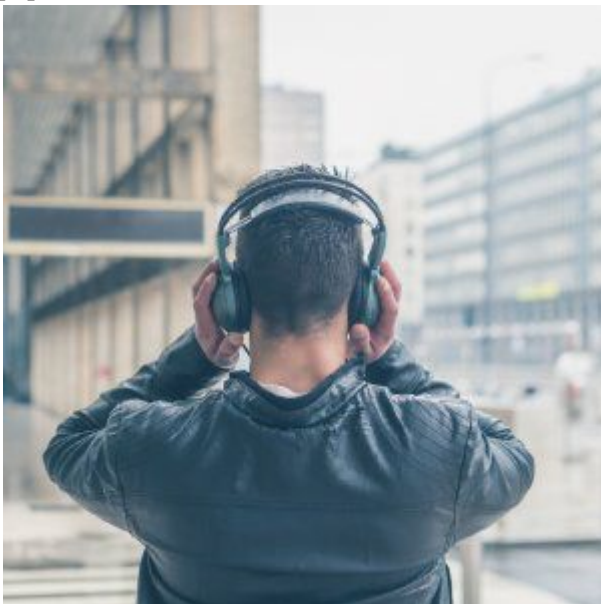


Figure 5. Listening to music is helpful to stimulate oxytocine, the hormone of pleasure. The headphones with favorite music stimulates relaxation neurons and it favours wellness and positive vibrations.

According to German research, listening to Mozart's passages helps to lower blood pressure. Wolfgang Amedeus Mozart's and John Strauss' music help to lower blood pressure and cardiac frequency, by balancing heartbeats. That cannot be said as for Abba pop group for example, which is not proven to have the same relevant effects upon blood pressure. Research sometimes avails of scientific evidence of events that the common sense considers as unquestionable. These are the results performed by a German study, from the Ruhr University in Bochum, edited on *Deutsches Ärzteblatt International*³⁴ reviews. Surveyors involved 120 people in their study among whom 60 have listened to music for 25 minutes, another 60, chosen as control group, remained silently. Those who listened to music were divided into three groups: one dedicated to

Mozart (with the *Symphony No. 40*), one to Johann Strauss and the last to the Abba pop group (with a 2009 compilation that included songs like "*Thank You for the Music*", "*The Winner Takes It All*" and "*Fernando*").

Mozart above all. All participants were measured with pressure, heart rate and cortisol level, the so-called stress hormone. Although with any type of music listened the level of cortisol was lowered, especially in women, instead for the heartbeat and pressure there were differences. That of Mozart was absolutely the music that gave the most evident results, with the heart rate calming down: the systolic pressure, that is the maximum, was lowered by 4.7 millimeters of mercury, and the diastolic, that is the minimum, of 2.1. Following the passages by Johann Strauss, with a reduction of the maximum of 3.7 millimeters of mercury and a minimum of 2.9.

No substantial effect, however, has been observed with Abba's music.

The other study. A positive news for hypertensive people who could undergo music therapy sessions to get better. Blood pressure is a factor to keep under control to prevent the risk of heart attacks, strokes and aneurysms. This study of the subject was not unusual. A connection between listening to classical music and the possibility of conditioning the heart rhythm has long emerged. Researchers at Oxford University had previously talked about a cardio-tonic effect and a lowering of blood pressure in patients who listen to Mozart songs. The British researchers had focused on a wide clinical literature on the subject, discovering that some particular types of *adagios*³⁵ exercised a relaxing effect over cardiac muscle and thus, a lowering of the arterial pressure.

Music in intensive care. Music has also entered intensive care to cheer patients who have had heart surgery. On June 24, at the *Irccs Policlinico San Donato*, on the outskirts of Milan, a concert is held by the New String Quartet of Villa Mariani, directed by maestro Roberto Mazzoni, professor of viola, chamber music and orchestra. "It is not only a matter of 'pleasant' attention - the experts at Irccs points out - but of a real help for a faster remission: in fact, in the light of recent scientific studies, the beneficial effects of classical music on the control of hemodynamic parameters and the pain threshold of patients. Several publications have proven the existence of dynamic interactions between music, the cardiovascular system and brain stimulation: listening to music causes a release of endorphins, and therefore a consequent condition of well-being that reduces respiratory frequency and improves activity heart ".

A recent research also stated that music time at school is a "vitamin" for brain.



Figure 5. Music favors friendship and socialization among children.

Recent studies have shown that to improve one's language skills, learning to play or sing in the music hour plays a fundamental role. Therefore, music school-time exempts the same relevance as geography, history and Italian language school-time. Conversely, from what the neuro-scientists have discovered, music as a school subject would have a possible greater relevance; that's the reason why activities such as singing a song, knowing how to play an instrument and listening to Beethoven, they are activities which can empower the cognitive development and natural sensations in children as well as in adult learners. Scientists, beyond this have proven that music teaching may exempt a crucial role on the positive answer of people like those who present language discrepancies, such as dyslexia affected people, or even autism affected patients. Both music and perception, in fact, detain an important role upon the sensorial nervous system as well as upon some cognitive centers present in brain.

NOISE WILL NO LONGER BE A DISTRACTION

In San Diego, Southern California, on the occasion of the annual Aaas meeting, the American Association for the Advancement of Science, an association that deals with the progress of science, Nina Kraus, who collaborates with North western University located in Evanston in Illinois, she was able to illustrate how the musical experience can also help to better listen to those who are talking in what is a noisy environment.

The professor, as well as a researcher from Trieste, emphasized that this can happen since the music allows us to isolate sounds. All this is the conclusion of a long study carried out on the brain of musicians. The professor, as well as a researcher from Trieste, emphasized that this can happen since the music allows us to isolate sounds. All this is the conclusion of a long study carried out on the brain of musicians. Professor Nina Kraus, has theorized how, for example, during a concert, each member of the orchestra is able to "*stick*" at the right correct time his performance, because he is able to pick up the key signals.

Her surveys attest that the nervous system may answer to what is called acoustic stimulus, namely the language, as well as music stimulus, just waiting for milliseconds. In his research, musicians are able to do it much faster than other individuals.

MUSIC IMPORTANCE FOR DYSLEXIA AND AUTISM

The researcher, therefore, has had the opportunity to bring to the attention how a musical experience permits to listen more carefully to other people. Moreover, thanks to the musical experience, it is also possible to interpret, with greater ease, what are the nuances of the language which, generally, are linked to the slightest changes of what is the intonation of the voice of who is speaking. It is summoned up from all of this that all children who have received a musical education are able to maintain more easily the concentration and the attention even in a noisy classroom. Having the ability of better listening, as a consequence, they are capable to perceive his teacher's voice even in presence of noises. A relevant aspect towards subjects with language problems, such as, for example, autistics and dyslexics. Conclusively, music teaching assumes a new role, that is to model the subcortical sensorial circuits. as the scholar Nina Kraus claims.



Figure 6. Culture is unconventional medicine which exerts a very important role on human wellness
Because culture is good as a real medicine
Museums, concerts, theatrical performances. Just take them on: they keep away from diseases

Being overwhelmed by a Picasso's brushstroke or daydreaming on a cinema chair; that's not just as stunning. It is also healthy. As well as attending museums, theatres and concerts. Just that **culture is a pharmakon**, capable of preventing and nursing pathologies of body as well as mind. Just take it at regular doses to get tangible effects which can even potentiate the effects of conventional medicines.

Those who know it very well are white-coats of the Franco-Canadian Association, who since some weeks have started to prescribe visits to museums to their patients, thanks to an agreement between Fine Arts Museum of Montreal, which guarantees, **the freely admittance to the illness**, even if they are not accompanied, suffering from a wide range of maladies, from diabetes to depression, from cancer to chronic pain.

The one-year long pivot project unfolds a world-wide scenario, as it embraces a new medicine branch where culture exerts a role of a powerful instrument of **prevention** and care, to be recommended as well as any diet or a regular physical practice³⁶.

The Scandinavian countries were the first to infer its potential effects ten years ago: Finland has even sponsored a program called Taiku, Art and Culture for the health and well-being of population, which provides a accurately hospitalized person by person conceived study.

Evidence of effectiveness

Music, dance, cinema, art ground on any formulation of the "stimulant" culture, which owes its effectiveness to very powerful active ingredients: beauty, intellectual stimulation, relaxation, socialization and movement. A powerful mixture capable of keeping away **depression** risk, as a recent study edited on *British Journal of Psychiatry* demonstrates by researchers of University College of London: it is conducted over more than 2.000 over 50 followed-up women for a decade, intriguing that **a routinist involvement to culture at least once a month lowers the risk of depression of 48%**.

Its effects are almost immediate, **just after a single few hours- long experience**, as the trial conducted in Italy on 100 volunteers (between 19 and 81 years), who were carefully harnessed up 63 metres of height to visit frescoes of elliptic biggest dome in the world, that of the sanctuary of Vicoforte in Cuneo district³⁷

«**The exposure to beauty** has claimed **immediate beneficial effects**, such we have noticed in a preponderant manner», **Enzo Grossi** the coordinator of research points out, who acts as Scientific Director at the Foundation villa Santa Maria, and who has been engaged for years in studying the relationship between art and health.

«The dome visit **has increased** the sensation of wellness perceived by participants, by lowering of 60% the **cortisol concentration**, which is the stress hormone measured in the spit. A very meaningful **result**, if we think that high cortisol levels, endured in time, may damn brain by causing depression and **Alzheimer**».

What happens to the brain

It took the most sophisticated neuroimaging techniques to unravel the mechanism by which the culture "stimulant" acts on our brain.

«**Specific neurons of the orbitofrontal cortex**», doctor Grossi points out «This **cerebral centre of beauty produces** signals such as endorphins, which give happiness, the **dopamine**, which evokes pleasure and the **oxytocine**, the hormone of love.

These **neurotransmitters affect the most ancestral centers of our brain**³⁸ that lead vital functions such as breathing and cardiovascular risk.

Furthermore, through the lymphatic net which **connects the encephalon** to **immune system**, culture aims at potentiating defenses against outer menaces, such as viruses and bacteria, as well as inner ones, such as cancer and degenerative pathologies.»

A useful therapy for everyone

Anyone may benefit from these effects, as **Gabriella Bottini**³⁷ points out, who is full professor of Cognitive Neurosciences of University of Pavia and Director of Neuropsychology Centre of Niguarda Hospital of Milan :« **Cultural activities are good at each age. They promote cognitive development in children, prevent the abuse of alcohol and drugs in adolescents helping them to engage their leisure time constructively, relax adults stressed by daily tasks and keep the brains of the over 50 active by preventing dementias** ».

Likewise some **art-therapy** experiences in a lot of hospitals demonstrate, culture can be a powerful instrument of therapy even to whom suffer from neurodegenerative pathologies, such as Alzheimer, mental pathologies such as depression, psychosis and schizophrenia, learning and affective disturbs, but even cardio-vascular pathologies, tumors and motor disabilities with motor limitations.

«For these patients there are real scientific experiments aimed at discovering the most suitable cultural activities and the correct "dosage". Because the secret lies precisely in "practicing non-one-off cultural activities, but in a regular way, like sport," Gabriella Bottini explains. «In like manner **it should be better to take advance in rearrange brain on what we are going to see, namely** being able to interpret the meaning of beauty for activating into our brain some potentials in view of an increase of pleasure and the positive effects that our body enchain», Enzo Grossi concludes.

Opportunities not be missed:

Many initiatives and facilities for those who want to enjoy the benefits of culture for free or at very low prices.

For anyone. The days of the year to be freely exploited in museums and National archaeological sites rise from 12 to 20 some of which will be nationally dated, such as, the Week of Culture from 5th to 10th March 2019, while others will be fixed in different data.

For youngsters. The entrance to museums, monuments, galleries and archaeological areas is free up to 18 years. From March the reduced ticket for 2 euros for 18 to 25 years old will start. Reduced lounge chair until 2 euros for under 25 even in the most prestigious Italian theatres, such as the Scala in Milan. For 2019 the culture bonus 18app was then renewed, offering € 500 to those born in 2000 to spend on cinema, music and concerts, cultural events, books, museums, monuments and parks, theatre and dance, music courses, theatre or foreign languages.

All initiative and facilitations for who wants to freely enjoy from benefits of culture or a very convenient prices.

For families. Many museums offer tax benefits for families and children, who since October can count on specific initiatives organized for the National Day at Museum. Also the initiative **Born with culture** is worthy to be signaled; started from Turin and now widespread also to Brescia and Pavia, it predicts the new cultural passport for each new born up to the accomplishment of the first year of age.

For aged over 65. Greater part of museums as well as archaeological sites, cinemas and theatres, despite of the end of free admittance benefit period, provide also half-price tickets and membership.



Figure 7. Attention during a class-lesson implies a series of neurocognitive mechanisms including memory activation. Listening to music helps long term memory to store as many messages as possible; the cognitive processes pick up the sensations, emotions, and positive vibrations on this magazine and it produces a long-term lasting pleasure and positivity.

by [Paola Rinaldi](#)

According to ISTAT recent data, almost 20% of children who at school need of teacher's aide also presents **speech and learning disorders**³⁸ where in most of cases teachers are not fully specialized as 36%, being unprovoked of enabling title. A discouraging datum, if we add the increase of pupils with problems such as dyslexia, disortographia, digraph, dyscalculia and difficulty in communication.

«According to epidemiologic surveys, Italian population in evaluative age with diagnosis of Sld, that is specific learning disability, ranges between 2,5% and 3,5%, Mirko Cario³⁹ psychologist, expert in learning psychopathology in Rome explains. "Compared to the past, however, today it is possible to recognize these difficulties early and to exploit the ability of the brain, very high in preschool age, to modify its structure in response to stimuli".

The first signs at nursery school

Sometimes some harbingers occur already in the early ages of nursery school, when the child shows out difficult in maintaining attention during the game, he seems not to listen when he is spoken, he is easily

ruffled. These are the most common signals however compatible to other disturbs of development, genetic syndromes, or even pathologies which can patent through nervous ties and neuropsychiatric problems. «For a more appropriate diagnosis recognizing some alarm bells, such as the use of appropriate words and the difficulty of distinguishing sounds or formulating phrases. He may disguise, furthermore, a scarce ability in manual activities and some effort in tasks that require short-term memory, such as learning nursery rhymes"- the psychologist remarks.

The test at primary school

The problem may be easily identified starting from primary school, when specific tests may be performed, such as reading, writing and calculus tests. «During the diagnostic iter also the traditional IR, or intelligence rate is quoted, taking into consideration, for example, its self-esteem level and obviously the system of social and friendly relationships. ».

Recognizing the problem at an early age is essential, because it allows us to suggest the best educational paths for the recovery and enhancement of skills. The student learns to accept their difficulties and to compensate them also thanks to various technological tools.

« On the contrary, a delay of the diagnosis may lead to a series of consequences, such as anxiety, frustration, rage and sense of inferiority, which detriment the school results, as well as the emotive sphere. », the specialist warns.

«Children with Sld may feel inferior than others and they may patent by time even behavioral problems, such as aggressivity or refusing any kind of authority.

Whether medical opinion comes later, even in full of adolescence, it may happen that the boy may have already accumulated tiredness and repulsion towards study, besides a low level of self-esteem», the expert underlines.

Just take in consideration that Sld may alter all sectors of life: from the sports field, where understanding and memorizing the techniques may be crucial, up to time or money management, where planning and calculation skills prevail.

«All of this, during the growth in adult age, may bulge to depression, increased risk of drugs or alcohol addicted and other socially relevant conducts such as vandalism and dangerous driving, which merely satisfy the need to overwhelm their own limits³⁹.

The fundamental role of parents

In sum, a sudden help is required. If in the most cases the school has the duty to signal potential difficulties, parents exert a fundamental role in the recovery process: both mums and dads must put in contact with specialized associations in Sdl, comparing with teachers to attempt to search for helping strategies, avoid to inflict punishments for school perform and encourage child's autonomy.

«Learning disturbs are not linked to an intelligence deficit, but to different activities in cerebral areas, which can be subdued to a reeducation system by specific strategies», doctor Cario ends up. «These children just need of greater attentions in order to develop their own potentials and, by this perspective, create a welcoming and motivating ambience is crucial.».

Here are the most frequent problems

DYSLEXIA: it is the difficulty to read and write correctly and fluently. The words of a text appear closer, crowded, distorted, blurred or even differently oriented on the sheet. For a dyslexic child the word "divertente" could appear as "difetente ".

DISORTOGRAPHY: those who suffer from it have difficulty converting the sounds of verbal language into graphic symbols (the letters of the alphabet): for example, parts of the word are omitted (pote by ponte) or graphemes (vaccia per faccia; acne for cane).

DISGRAFIA: the child has difficulty reproducing alphabetic and numerical signs. He cannot write correctly on one line and the size of the letters is variable. Moreover, he struggles to report in writing what he thinks.

DISCALCULIA: it is the difficulty to understand and operate with numbers, to memorize the multiplication tables, to perform the normal calculation procedures. The dyscalculia-affected child finds it difficult to count, read the numbers and have a quantitative sense (50 is greater than 30?).

Tailor-made activities

According to the law 170 of 2010, pupils with a diagnosis of Sdl are entitled to a personalized teaching plan which, based on individual characteristics, provides for so-called compensatory and dispensatory measures. In essence, the student will be able to make use of assistive tools (such as recording of lessons, texts in digital version, vocal synthesis for reading and using the calculator), or be exempted from certain tasks (such as reading ad aloud). You can use scheduled questions, only oral tests and extra time for the tests.

Brain specialization or modularity

The main lesson that can be drawn from contemporary studies of the brain in its activity is related to its high specialization, both anatomical and functional. Every minimal area of the cortex seems to be reserved for a specific function and can be considered as a micro brain (or module) specialized in processing particular information⁴⁰ Taking into consideration the case of language, it may be observed how its modular scheme organization is yet worldwide accepted. Its realization mostly grounds on the integrity of the left hemisphere of the brain. Currently, we know that modularity in language affects not only a mere bipartition comprehension/ expression but it also involve most fundamental components such as abilities afferent to phonology, sintaxis, ortographical comprehension and semantics. Howard Gardner considers music as an reversion of different kind of intelligence. He actually identifies six main human faculties: linguistic, musical, logical-mathematical, spatial, kinesthetic-bodily and personal intelligence. Considering music in a context of modularity of this kind, it seems therefore that the brain must have a brain substrate reserved for it, genetically programmed, which would have the sole function of ensuring the allocation of a highly specialized device reserved for music. This device would be placed within the neuronal circuits in a relatively constant manner in all the individuals belonging to the species that are exposed to musical stimuli.

The opposite position to that of Gardner, to which a good number of specialists in cognitive activity (cognitivists) adhere, considers music as an exercise in intelligence, as a reflection of the general functioning of the human brain. Music would bring into play all of a series of activities or processing attitudes which participate in other functions or not for human survival, ("parasitic" hypothesis). In order to choose between the hypothesis of modularity and that of parasitism it is necessary to resort to numerous sources of information, one of the most direct is that of neuroscience. In fact, if the music corresponds to a separate human faculty (hypothesis of cerebral modularity), in the sense that it brings into play a specific device, then it must be "isolable" within the brain itself. The temporal lobes of the right and left hemispheres are able (even if "artificially" solicited) to evoke musical experiences. Despite the fact that these lobes are represented bilaterally, the fact that in people without any musical formation we can evoke the emergence of exclusively musical memories emphasizes:

- either the influence of the surrounding musical environment, which remains anchored for unsuspected durations to neuronal circuits;
- or the importance of brain specialization for musical experiences.

Therefore, if there is a musical faculty in the brain, its substrate is certainly located in the neuronal networks of the superior temporal lobe of the human brain.

The organization of music within the cerebral cortex

Starting from the first discoveries on the modularity of the brain the problem of music localization emerged. The first firm points in this regard were focused on language, which was located in the left cerebral hemisphere of the right-handed person; a logical corollary led to the supposition that the same cerebral hemisphere must be the repository of every higher human function. Some subsequent studies have highlighted the obvious contribution of the left hemisphere in the context of musical activities and others

have instead shown the dominance of the right hemisphere. An interesting hypothesis is to consider the possibility that the left hemisphere is the most acquainted part of the brain. Being the first studies based on the observation of music professionals, it is obvious that the conditions to demonstrate the dominance of the expert hemisphere (in the musicians, the left one) were added. On the contrary, since studies on vast audiences of subjects affect people from all backgrounds, they include a preponderant majority of musically unprepared individuals and therefore highlight the right hemisphere (of non-musicians).

The organization of music within the cerebral cortex

The first conclusion that can be drawn about the search for the location of the musical faculty in terms of cerebral hemispheres, is a "non-place to proceed" that can be interpreted in so many ways. Music involves both cerebral hemispheres and the dominance of one over the other is an uncertain phenomenon. The scenario that emerges in a most truthful manner is evoked by the suggestion that the music faculty does not emerge as a proper faculty that any individual possess or does not possess; the music faculty grounds on a series of relatively autonomous modules from each other and, thus, subject to being placed in different areas from each other. There is also the possibility that the issue is incorrectly set. The scenario that emerges in a most truthful manner is evoked by the suggestion that the music faculty does not emerge as a proper faculty that any individual possess or does not possess; the music faculty grounds on a series of relatively autonomous modules from each other and, thus, subject to being placed in different areas from each other.

Principles of brain organization

As already mentioned, therefore, given that for language, as indeed for most apparently simple mental activities, a series of relatively distant modules are brought into play; there is no reason to think that for music it could be otherwise. Furthermore, a biologically determined faculty can be distributed on both hemispheres⁴²

The fact that language is essentially confined to the left brain hemisphere is more an exception than a rule. In each of the cerebral hemispheres, modules capable of specifically contributing to the current activity are allocated. The identification of such lateralized modules does not yet determine unanimity, not even in the field of vision, in which research is more advanced. It is therefore not so surprising having to admit that things are the same also for music.

Analysis of the "recognition" of a piece of music

The recognition of a piece of music proposed at the auditory level is apparently immediate, but in reality it mobilizes different modules. The intervention of these modules takes place both in a parallel and serial way in order to identify the unique character of the piece. According to the outline that we will see, the listener's brain that perceives a piece of music presented at the auditory level, follows the following procedures: it operates a structural analysis (defined melody organization) of the sequential variations in the characteristic heights of the sounds and in parallel performs a analysis of the temporal peculiarities of the piece (defined temporal organization).

Melodic organization:

The distinction between variations in the height of the sound and variations in duration is given by the musicians and numerous cognitivists. It could be different in perception and in auditory memory (of "illiterate" subjects), recent studies in fact prove that height and duration of sound are integrated in the perceptive analysis of a musical sequence, and they are to be considered as indivisible entities whose organization is guided by accentuation. As far as the temporal path is concerned, scholars are today in

agreement in identifying two main levels of organization: the metric (which refers to the measure); the rate that refers to relative durations.

Time organization:

Some scholars put forward the hypothesis of a metric link with rhythm as a result of the intervention of cluster mechanisms, while others (also supported by neuropsychological studies) see these two levels of organization as resulting from the intervention of totally different mechanisms.

Directories

Speaking of repertoire, we refer to the existence of a sort of lexicon containing memorized representations of all the music to which the individual was exposed during his life. It is possible to suggest to forward the idea that the representation arising from a series of melodic transformations, rather than temporal ones, the determine factor to accede the repertoire, such as to reach in after recognition. According to the model presented, the musical piece would be recognized only if an adequate combination of the abstract representations provided by the two analytical paths was realized (with a predominance for the melodic evaluation in our western culture) and the representation stored at the level of repertoire. Once this operation is completed, the brain is already able to make a judgment of familiarity and even to reproduce the piece heard. There is also to consider the incidence of the "emotional factor" on the model just described. Some studies suggest the existence of another series of modules connected to emotions, which would be relatively autonomous from the recognition system that we examined.

Dichotic listening⁴⁴

The dichotic listening consists of presenting, by the help of headphones, a sound stimulus to the left ear, and, at the same time, another sound stimulus to the right ear; if at the end of a certain number of dichotic listening, the auditor patents a better capacity of information reception of one ear than the other, it may be inferred that the contra lateral hemispheres answers more efficiently to the received stimuli. A group of people, all musicians, are made to listen to sequences of three numbers sung according to different sound heights (higher and graver) and presented in a dichotic way (a different series, simultaneously, in each ear). The listeners must then reproduce, singing, immediately after the presentation of each series, what they have just heard. The results obtained with musician listeners show that the numerical sequences presented to the right ear are better memorized, even if the heights of the sounds presented to the left ear are reproduced more correctly. Similar results confirm the widely accepted dominance of the left cerebral hemisphere relative to language (enunciated numbers). The same results suggest that the music associated with the numbers in question refers to a brain substrate, which has its main site in the right hemisphere. The demonstration is particularly spectacular because it illustrates the possibility that the linguistic and musical modules are activated in parallel independently to process information relating to the respective area.

"Evoked potentials"

The technique of "evoked potentials" consists in the specific analysis of the signals detected by the electroencephalogram. This technique was used to capture the brain activity evoked by language and music in a more natural listening situation than dichotic listening. The results of this technique (experimented on musicians) highlight, once again, the independence of the cerebral generators of the electrical activity triggered by the words and music of the same piece (opera). The location of these two types of generator is yet to be established.

POSITRON EMISSION TOMOGRAPHY

Positron emission tomography records the increase in blood flow to the brain in response to the increased oxygen demand in the activated brain region. This technique was used to investigate again the cerebral

autonomy of music with respect to language; in this case, not only with respect to listening, but also in relation to reading. The results obtained demonstrate how the brain areas activated for music appear different and adjacent to those affected by the language. The anatomical separation confirms the sensitive autonomy of music with respect to language, regardless of whether the code is visual or auditory. The parallel brain organization suggests that the modules assigned to music and language follow a very similar path. This last observation explains why amusia and aphasia often occur in the same individual.

Amusia (from the Greek a-musia, lack of harmony) is the biological inability to understand, perform and appreciate music. As with dyslexia, amusia is a pathology due to reasons of cerebral origin, congenital or acquired later (due to brain damage, for example). About 4% of the population is affected. Isabelle Peretz, neuropsychologist at the University of Montreal, talks about Amusia for the first time. Aphasia, on the other hand, is the loss of the ability to compose or understand language, due to lesions in areas of the brain responsible for its processing. Therefore, speech disorders caused by primary sensory deficits, intellectual deficits, psychiatric disorders or weakness of the musculoskeletal system are not included in the aphasias. As an introduction, we can take into consideration, from the archives of the neurological clinic, the results of two observation sessions.

The first case concerns a professional composer, Vissarion Sebalin. At 57, the composer is suffering from severe hemorrhage in the left hemisphere of the brain. This vascular accident prevents him from verbally communicate, as he cannot be able to comprehend the most straightforward questions, being totally deprived of the merest intelligible way of expression; he suffers from an acute phase of aphasia. The composer then continues to practice his profession until his death, which occurred four years later. During these four years of aphasia Sebalin works assiduously with his students, listening and correcting their compositions. He also composed fourteen choirs, two sonatas, two quartets, eleven songs and a symphony. His colleagues say that the music composed in this period does not differ from that preceding the aphasia. Remarkably, the story of this composer, who has become a speechless musician following a brain injury, characterizes a neurological condition known as "aphasia without amusia".

The second case under observation in the field of clinical neurological research is complementary to that of Sebalin and concerns an ordinary woman, without any particular linguistic or musical talent. This lady, named Isabelle, runs a restaurant when, at the age of 28, she finds herself having to undergo a dramatic series of brain operations. She was subdued to three surgical interventions. The first involved the left hemisphere of the brain and was performed to stop the bleeding caused by the rupture of an aneurysm; the second was necessary to reduce an infections subsequent to the first operation; the third, was declared necessary to bind a second aneurysm about to break in the right hemishpere of brain. Isabelle's brain images show two large brain lesions, one in the left hemisphere and one in the right hemisphere. It was amazing to notice that nowtiwithstanding the deep lesions, Isabelle did not loose any of her linguistic abilities.

Ten years later after having subdued to cranial trepanation, in the period when such observation is being carried out, Isabelle wrote this poetry to her partner.

Here are two stanzas:

*Listen to me, please, I need to talk
Give me just a few moments
Accept what I live, what I feel
With no restraint, with no grasps
Listen to me, please, I need to talk
Don't interrupt me and don't try to analyze
Don't try to violate my inner world
I perfectly know what I want and how far I can go
(published in full in Peretz, Belleville and Frontaine 1997).*

She does not limit herself to communicating verbally with humor and ease, (apart from a slight disorder of the articulation), but she enjoys a completely normal intellectual and social autonomy. Her problem is music. Isabelle complains of not being able to perceive music as before. I must point out that the woman grew up in

an environment of music lovers and that her brother runs a light orchestra. In reality, as a child, Isabelle did not engage in musical activities with too much diligence. This does not deserve her, such she herself would often punctualize, on the fact that music has always played an important role in her life. Loosing her positive vibrations towards music represents for her an handicap. As a matter of fact she cannot even recognize or reproduce the simplest of melodies she used to familiarize with in the past, just before her surgical intervention on her brain. She fails to retain in memory the least trace of what she has just heard, and this leads her totally incapable to expressly any judgment about the greatest part of music nuances that any listener to music can easily perceive. This is obviously a case of "amusia without aphasia".

This neurological condition decrees the true existence of a musical brain inside us. It would have been not the case of Sebalin, probably because his cerebral circuits which sovereign musical activities, have not affected from cerebral hemorrhage. On the contrary, the musical brain would have been affected, in an equally selective way, in the case of Isabelle, as this part of the brain resided precisely in the brain areas affected by dysfunctions following bleeding and surgical operations.

ANCIENT COMPOSERS AND THEIR PATHOLOGIES

Felix Mendelssohn



Felix Mendelssohn Bartholdy, born in Hamburg in 1809 and died in Leipzig in 1847. He was a composer, orchestra director, pianist and German organist during the Romanticism. Grandson of the philosopher Moses Mendelssohn, (who came from a very poor Israelite family), Felix was born in a prominent family condition, as his father Abraham, a Moses banker from Berlin, had created and consolidated a remarkable financial heritage. Felix was raised without religion until he was seven, when he was baptized as a reformed Christian. Already at a very young age he was recognized as a musical prodigy (at the age of eleven he began to compose his first symphonies for string orchestra), but his parents proved prudent and intelligently never tried to capitalize on his talent. Initially he enjoyed good success in Germany, where he revived interest in the music of Johann Sebastian Bach, and in his travels in Europe. He was particularly well received in Britain as a composer, conductor and soloist, and his ten overseas visits - during which many of his most important works were premiered - formed an important part of his adult career.

His musical tastes were essentially conservative, distinguishing himself from many of his musical contemporaries more open to innovations such as Franz Liszt, Richard Wagner, Charles Alkan. The Leipzig Conservatory (now the Leipzig University of Music and Theater)), which he founded, became a cornerstone of this anti-radical vision. Mendelssohn wrote symphonies, concerts, oratorios, piano music and chamber music. His most famous works are his *Overture* and the stage music for *Dreams of a Midsummer Night* (the only *Overture* was composed at the age of 17), the Symphony called *The Reform* (catalogued as No. 5 but composed as a second), the Italian Symphony, the Scottish Symphony, the overture of *Le Ebridi* and his *Concerto for violin and orchestra* and the two *Concertos for piano and orchestra* (op.40).

His -Romanze senza parole- are the most famous composition for solo piano. After a long period of relative denigration due to the changes in musical tastes and anti-Semitism that occurred between the end of the 19th century and the beginning of the 20th, its creative originality is today recognized and re-evaluated, and is counted among the composers most representative of the Romantic period.

Felix Mendelssohn had warren, inscribed in the genetic code, the physical tare of inheritance of a demanding disease, which extrudes generally in asymptomatic way until it compromises all the vital organs: a hypertension of malignant nature (a disease that at those times could not be quantitatively appreciated in diagnostic terms, as the "engine" measuring the systolic and diastolic rhythm was for to be conceived. In

1847 Felix, bent and slow walking, resumed writing the *Romantische Oper*, ended the quartet d'adieu in F minor, finished the fourth choir of the *Wandersmann*. Later he fell into depressions, fatigue, uncontrollable sleepiness until he had a series of strokes.

FRYDERYK CHOPIN



Fryderyk Franciszek Chopin, (Azelazowa Wola, 22 February 1810 – Paris, 17 October 1849), was a Polish-born composer and pianist. He was one of the great masters of romantic music, sometimes referred to as the "poet of the piano", whose "poetic genius" is based on a professional technique that is "unmatched in his generation. A child prodigy, he grew up in what was then the Duchy of Warsaw, where he was able to complete his musical training. Following the Russian repression of the November Uprising (1830), at the age of 21 he moved to Paris in the context of the so-called Great Polish Emigration. During the last eighteen years of his life, he gave only about thirty public performances, preferring the more intimate atmosphere of the salons. He lived and maintained thanks to the sale of his compositions and the teaching of the piano, for which the demand is rather conspicuous. Chopin made friend with Franz Liszt and he was admired by many of his contemporaries, including Robert Schumann. In 1835 he was awarded with French citizenship. After the failure of the relationship with Maria Wodzińska, which lasted between 1835 and 1837, he undertook an often controversial relationship with the French writer George Sand. A brief and unfortunate stay in Mallorca with the Sand, which took place between 1838 and 1839, coincided with one of his most productive periods as far as composition is concerned. In his later years, he was financially supported by his patron Jane Stirling, who also organized a trip to Scotland in 1848. For most of his life, Chopin suffered from ill health. He died of tuberculosis in Paris in 1849. Greater part of Chopin's compositions were written for a solo pianist; the sole meaningful exceptions were represented by the two concerts, for further compositions for piano and orchestra and the Sonata op.65 for piano and cello. He also wrote some chamber music compositions and some songs on Polish lyrics. His piano style was highly individual and often technically demanding, but always maintaining the right nuances and expressive depth. He invented the musical form known as the instrumental ballad, and brought remarkable innovations to the piano sonata, the mazurka, the waltz, the nocturnal, the polonaise, the study, suddenly, the joke and the prelude. The influences on his compositional style include Polish folk music, the classical tradition of Johann Sebastian Bach, Wolfgang Amadeus Mozart, Ludwig van Beethoven and Franz Schubert, like that of the Parisian salons where he was a frequent guest. His innovations in style, musical form and harmony and his association of music with nationalism have been influential throughout the Romantic period and even later. His universal success as a composer, his association (even if only indirect) with political insurrection, his love life and early death have made Chopin a myth of romance. He has been the subject of numerous films and biographies with different levels of historical accuracy.

Chopin, as a young man, enjoyed a slender figure and a respectable stature; at a mature age he always remained underweight of about thirty kilograms. He suffered, from a child, an extreme inclination to fatigue, if he ever played the piano for more than twenty minutes, in fact he fainted. So much enervated ability excluded him, as well as from the show- like dimensions of the concert, even from sexual practices of every kind. Even playing the piano, he never allowed himself tiring crescendos or strong sounds. The

symptomatology that accompanied her from birth to death, was connectable, in everything and for everything, to a very important respiratory insufficiency called the syndrome of large Lansteiner.

ROBERT SCHUMAN



Robert Alexander Schumann (Zwickau, 8 June 1810 - Endenich, 29 July 1856) was a German composer, pianist and music critic. He is recognized as the initiator and at the same time one of the greatest composer of romantic music. The musical Romanticism dates back to his first piano compositions, published in 1830. His music reflects the deeply individualistic nature of Romanticism. Intellectual and esthete, he was little understood in life, but his music is today considered boldly original for the harmony, the rhythm, the form and for the revolutionary role of the piano in his compositions.

She was Clara Schumann's husband, also a pianist and composer, who after her husband's death continued to perform for about forty years at the highest levels (she is considered the greatest female pianist of the nineteenth century). Clara worked hard to spread her husband's music beyond the circle of her illustrious admirers, including Franz Liszt, Felix Mendelssohn, Hiller, the young Johannes Brahms. Furthermore, she did not spare fierce criticism to those who, in good or bad faith, expressed themselves negatively about Robert Schumann, first of all, Richard Wagner.

The human and artistic vicissitude of Robert Schumann is undoubtedly marked by evil and also by the most pathetic recurrences, even spectacular, of an extreme existential discomfort and even histrionic. Schumann is one of the few musicians who, had he not been saved by two generous fishermen, who forcibly drew him ashore from the icy waters of the Rhine, when he threw them in 1854, would have entered the huge list of suicidal composers. He is one of the few musicians, Roberto Schumann, who had to develop real psychotic-like states. On his way Schumann was unable to meet prominent medical personalities; he did not submit to the diagnosis of luminaries comparable to those he visited and treated, even if in vain, Chopin. In 1854 Schumann, half-blind was detained in a clinic for neuropathic at Endenich, where he remained until his death.

Ezio Bosso



Bosso was born in Turin in a working-class family but from his earliest beginnings he showed that tension to overcome any kind of border that characterized his long career. At sixteen he made his debut in France as a soloist, then completed his studies in double bass, composition and conducting at the Vienna Academy and collaborated with several European orchestras, including: Chamber Orchestra of Europe, Festival Strings Lütern, Deutsche Kammer Virtuosen. Constant research, versatility, passion for disclosure, and generosity are the distinctive features of his artistic career and the list of collaborations with prestigious musical institutions and with concert seasons is rich, where he has performed as a composer or performer, as orchestra conductor or member of chamber ensembles, among others: Royal Festival Hall in London, Sydney Opera House, Palacio de Bellas Artes in Mexico City, Teatro Colón in Buenos Aires, Carnegie Hall NYC, Teatro Regio in Turin, Houston Symphony, Festival of Perelada, Carlo Felice Theater of Genoa, Lac Lugano, Music Park of Rome, Vilnius Philharmonic, St Martin in the Fields. Winner of major awards, such as the Green Room Award in Australia (still the only non-Australian winner today) or the Syracuse New York Award in the USA, his music is commissioned or used by the world's leading opera institutions such as the Wiener Staatsoper, Royal Opera House, New York City Ballet, Théâtre du Châtelet, San Francisco Ballet, Bolshoi Theater in Moscow to name a few, but also from prestigious choreographers and renowned directors. In London, where he lives, he was Principal and artistic director of The London Strings.

Among the many orchestras directed in the years before his break due to a delicate surgical operation and the neurodegenerative disease with which he lives, we remember: the London Symphony Orchestra, Tschech National Symphony, Orchestra from Camara de Madrid The Orchestra of the Teatro Regio, The Orchestra Philharmonic of the Teatro Regio of Turin, The Orchestra of the Accademia della Scala in Milan, The Regional Orchestra of Lazio, The Chamber Orchestra of Turin, Wien Residenz Orchester, Bonn Kammer

Orchester, The Orchestra of the Mozart Academy, L 'Verdi Orchestra of Milan, The Sydney Youth Orchestra.

Also important are the collaborations with great soloists, such as Mario Brunello with whom he had an intense collaboration in duo, with Francesco Manara (Prima Spalla della Scala), Roberto Gonzalez (Shoulder of the orchestra of the Academy of Santa Cecilia in Rome), and between which is worth remembering the fraternal relationship that binds him to the violinist Sergej Krylov. European Universities and which contains the first official anthem of this world institution. In 2011 he had to undergo brain surgery to remove a neoplasm that precipitated him, his words, into "a story of darkness". After surgery, he was struck by an autoimmune disease.

MUSICOFILIA

Oliver Sacks (1933-2015), a physician and writer, has long been a professor of neurology and psychiatry at Columbia University. He studied the behavior of human beings towards music for a long time, obtaining a clearer explanation of Musicophilia. This, which already appears in early childhood, represents our inclination to music. Below we will talk about some examples he mentioned.

A LIGHTNING IN HEAVENLY HEAVEN: SUDDEN MUSICOFILIA

TONY CICORIA

At forty-two, Tony Cicoria was a robust and well-shaped man, an orthopedic surgeon in a New York state town. On an autumn afternoon, he was in a pavilion on the banks of a lake for a family reunion. It was a beautiful windy day, but he noticed, in the distance, some storm clouds, he looked like he wanted to rain. Once out of the pavilion he went to a public telephone to call his mother, where he was hit by an electric discharge that made him jump back first, then forward, until he fell to the ground unconscious. A lady next to him began to perform cardiac massage, it was later discovered that she was a nurse in an intensive care unit. After recovering he was visited by his cardiologist who, through an ECG (electrocardiogram) excluded the hypothesis of a brief cardiac arrest. Cicoria also consulted a neurologist because he felt sluggish and had some memory problems. He gave him an EEG (electroencephalogram) and an MRI; but once again there seemed to be nothing out of place.

Back at work, he encountered a problem with memory, but all surgical skills were intact. Within two weeks memory problems disappeared and what happened next filled him with wonder. When life apparently returned to the norm, he suddenly had an insatiable desire to listen to piano music. It was a thing without precedent because as a child he had only taken a few piano lessons but without any real interest, he even listened to rock music. Driven by this sudden desire for music, he began to buy records and got a vertical piano for a friend to use at home. He barely read the music, but wanted to learn by himself while in his head resounded with music. This was incessant, "it comes from the sky" as Mozart said. Now Cicoria had to fight not only to learn to play Chopin, but also to give shape to the music that flowed continuously in his head, trying to play it on the piano, fixing it on paper. He woke up at four in the morning and played until he went to work, and when he came home he stayed on the floor all evening. He had come to convince himself that he was the protagonist of a sort of reincarnation: he had undergone a metamorphosis and received a special gift, a mission, that of "tuning in" to the music he called, "music from heaven". Last spring, Cicoria took part in a musical retreat where he prepared for his concert two pieces including one of his compositions. The latter showed an ability worthy of praise especially for an individual who had no musical training and had learned to play self-taught at forty-two. When he was struck by lightning, he had experienced a near-death experience and, at the same time, an out-of-body experience. To account for the latter, many supernatural or mystical explanations have been called into question. The pattern of such experiences seems relatively stereotyped: the individual has the feeling of no longer being in his own body but outside it and very often he looks at it from two to three meters in height (neurologists call this detail "autoscopy"). The subject has the sensation of clearly seeing the room, the people and the objects nearby, but he perceives them from an aerial

perspective. Those who have had experiences of this type often describe vestibular sensations, for example that of "floating" or "flying". Out-of-body experiences can inspire fear or joy or a sense of detachment; however, they are usually described as intensely "real": absolutely different from dreams or hallucinations. They have been reported in many types of near-death experiences, as well as in the case of temporal lobe seizures. Some data indicate that both the visual-spatial and vestibular aspects of extracorporeal experiences are linked to a disturbance of cortical function, especially at the junction between temporal and parietal lobes. So what to think of Dr. Cicoria's extraordinary acquisition of musicality, of his sudden music? Patients with degeneration of the frontal parts of the brain, the so-called frontotemporal dementia, sometimes encounter, when they lose their capacity for abstraction and language, to the appearance or release, however surprising of musical talents and passions; but this was clearly not the case with Dr. Cicoria, who remained perfectly able to express himself and maintained his high skills in every respect.

"SALIMAH M."

Salimah M., a chemical researcher, recently crossed the threshold of forty, began to have previous periods, in which she experienced "a strange sensation": sometimes it was the feeling of being on a beach known in the past, while at the same time remaining of the all aware of what surrounded her and was able to continue a conversation, to drive the car or to do whatever she was doing at that moment. From time to time these episodes were accompanied by a "sour taste" in the mouth. Despite having observed all these oddities, he did not consider them to have neurological importance. It was only when he suffered a major attack in the summer of 2003 that he went to a neurologist and underwent brain scans. The tests revealed the presence of a large tumor in the right temporal lobe - the cause of his episodes. The tumor was malignant and had to be removed. Salimah was very worried but fortunately the operation went well, most of the tumor was removed and after a period of convalescence Salimah was able to return to her chemistry work. After overcoming this ugly parenthesis of life he gave himself free time and became more interested in pastimes like cinema and parties. Then a new love, a new passion, entered his life. She herself said of herself that she was a "vaguely musical" child, she had played the piano a little, but the music had never had a great role in her life. Now it was different. He felt a strong desire to hear music, go to concerts on the radio or from CDs. Music tracks that had not previously transmitted her "no special emotion" could now push her into ecstasy and / or tears. He became "dependent" on the car radio, which he listened to as he went to work. Like Tony Cicoria, Slimah showed a drastic transformation in his relationship with music; if before it had been only vaguely interested in it, now it drew intense emotions and could no longer do without it. Tony and Salimah suffered both other more general changes. A surge in emotion, as if all kinds of emotions were somehow stimulated or released.



ROSANNA GALDI

Rosanna Galdi was born in Rome, Italy.

Descendant of an ancient and noble Salerno family, she won at the age of 3 an audition for Zecchino d'Oro competition⁴⁶ and she began studying piano. Her first public performance was at 7 years.

Due to her distinctive merits, she was admitted at the Conservatory "G.Rossini" of Fermo, a branch of Pesaro under the supervision of Mrs. Donella di Cecco. In 1993 she completed her studies at the Advanced School of Musicology and Musical Pedagogy in Macerata, with a dissertation on G. Rossini and she was awarded with a degree in History of Arts at University of Perugia.

"Suonare News" in 1997 quoted her among the best bachelor's degreed in Italy.

She was chosen among 250 students and she is the youngest Italian to be admitted to the "Mastère Européen en Management des Entreprises Culturelles" in Dijon, France.

Her project won her a scholarship at the University of Bari.

In 2001, she joined *Fermo libera movement*, as to protest against the state of decay in which Teatro dell'Aquila is involved.

She was involved in the communication of the Fermo Festival in 1993; in charge of marketing, sponsorship and communication with the International Orchestra of Italy in 1999.

She was elected Chairman of the Board at "A. Vivaldi" of San Benedetto del Tronto in 2001.

In 2002 she presented in foreign language the XX°International Tournament " Eta Tour" City of Porto S. Giorgio.

In 2007 she was involved in ambitious project, that is caring for the conception and installation of 20 frescoes that will be exhibited in Nicaragua, Mexico and South Korea.

After staying abroad for a long time, for reasons of study and work, she came back to Italy.

She established for the first time in 2008, at Porto S. Giorgio, in the Province of Fermo, in Marche region the "Musical Preparatory Workshops for children from 0 to 10 years".

She has a long experience in teaching.

In 2009 she founded the "RG Studio Management", a non -profit association for the development and economic promotion of the territory. She was awarded with important accreditations: the Ministry of Education, the Marche Region and for the first time the Province of Fermo.

She oversaw the marketing, communication and development of the eklenhaircare sales network, LooLoo Fashion and Jewelery, Gaelle and Chez Lou Lou.

Since September 2015 she has been an expert member, and MIUR representative, in the Board of "G.B. Pergolesi" State Conservatory of Music in Fermo.

The appointment before used to be exclusively political. She is one of 303 experts appointed by AFAM at national level; she accomplished her studies at "F. Morlacchi" of Perugia, where she graduated with Maria Flaminia Spaventi, and she became Maestro Stefano Ragni's disciple, as a consequence of a public selection, which she exploited for mere political purposes.

One of the pioneers of the web together with Mark Zuckemberg is the founder of Shake Web Italia, a service agency that in the first month of life has totaled 100 clients with its beloved collaborators.

She often deals with arts and she recently started posing as a model.

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RESULTS

Music has played a fundamental role in the culture, both in the past and in the present.

Advances in neuroscience now can demonstrate in which way music affects the brain. The neuromusicology is a branch of music research which quantitatively explores how music affects the brain.

Musicians if precociously initiated to play an instrument have superior working memory, auditory skills and cognitive flexibility. Areas of the brain which inhere to motor control, auditory processing and spatial coordination are larger.

Listening to music involves all perceptions and senses by stimulating and enhancing a series of chemical effects on brain, such as the release of dopamine, that is the brain's "motivation molecule" and an integral part of "pleasure-reward system". The lack of dopamine is linked to several pathological conditions such as Parkinson's disease and depression. Dopamine deficiency is the cause of loss of motivation and reward.

Ageing, the lack of stimuli, can dismiss the production of dopamine. For these reasons, it is very important to play an instrument that continuously encourage brain to produce dopamine and to provoke relaxing and warming effects on brain. As human being needs continuously to prove emotions and new feelings, dopamine production has the same effects as orgasm or eating chocolate.

Playing an instrument also implies higher memory such as long term memory to store perceptions and recalls that listening to music can evoke. It also stimulates motor memory to move like following the rhythm, the timbre and the tonality of a sound track. Music awakens senses too and it enhances a series of chemical substances to be released and it provokes a sensation of wellness and happiness.

It is very important, thus to prevent pathological diseases by putting people in conditions to listening to music. In fact it has well proven that individuals that precociously have been initiated to an instrument study may be less exposed to declining pathologies such as Parkinson and Alzheimer diseases and listening to music in autistic children can foster their relationships and their open- mind conditions towards the welcoming of social issues.

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