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People perceive and respond to music in different ways. The level of musicianship of the performer and the listener as well as the manner in which a piece is performed affects the "experience" of music. An experienced and accomplished musician might hear and feel a piece of music in a totally different way than a non-musician or beginner. This is why two accounts of the same piece of music can contradict themselves.

Rhythm is also an important aspect of music to study when looking at responses to music. There are two responses to rhythm. These responses are hard to separate because they are related, and one of these responses cannot exist without the other. These responses are (1) the actual hearing of the rhythm and (2) the physical response to the rhythm. Rhythm organizes physical movements and is very much related to the human body. For example, the body contains rhythms in the heartbeat, while walking, during breathing, etc. Another example of how rhythm orders movement is an autistic boy who could not tie his shoes. He learned how on the second try when the task of tying his shoes was put to a song. The rhythm helped organize his physical movements in time.

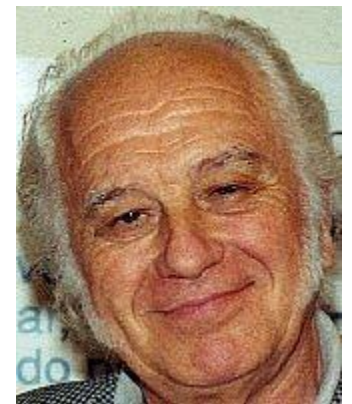
It cannot be proven that two people can feel the exact same thing from hearing a piece of music. For example, early missionaries to Africa thought that the nationals had bad rhythm. The missionaries said that when the nationals played on their drums it sounded like they were not beating in time. However, it was later discovered that the nationals were beating out complex polyrhythmic beats such as 2 against 3, 3 against 4, and 2 against 3 and 5, etc. These beats were too advanced for the missionaries to follow.

Responses to music are easy to be detected in the human body. Classical music from the baroque period causes the heart beat and pulse rate to relax to the beat of the music. As the body becomes relaxed and alert, the mind is able to concentrate more easily. Furthermore, baroque music decreases blood pressure and enhances the ability to learn. Music affects the amplitude and frequency of brain waves, which can be measured by an electro-encephalogram. Music also affects breathing rate and electrical resistance of the skin. It has been observed to cause the pupils to dilate, increase blood pressure, and increase the heart rate.


### The Power of Music on Memory and Learning

The power of music to affect memory is quite intriguing. Mozart's music and baroque music, with a 60 beats per minute beat pattern, activate the left and right brain. The simultaneous left and right brain action maximizes learning and retention of information. The information being studied activates the left brain while the music activates the right brain. Also, activities which engage both sides of the brain at the same time, such as playing an instrument or singing, causes the brain to be more capable of processing information.

According to The Center for New Discoveries in Learning, learning potential can be increased a minimum of five times by using this 60 beats per minute music. For example, the ancient Greeks sang their dramas because they understood how music could help them remember more easily). A renowned Bulgarian psychologist, Dr. [George Lozanov](#), designed a way to teach foreign languages in a fraction of the normal learning time. Using his system, students could learn up to one half of the vocabulary and phrases for the whole school term (which amounts to almost 1,000 words or phrases) in one day. Along with this, the average retention rate of his students was 92%. Dr. Lozanov's system involved using certain classical music pieces from the baroque period which have around a 60 beats per minute pattern. He has proven that foreign languages can be learned with 85-100% efficiency in only thirty days by using these baroque pieces. His students had a recall accuracy rate of almost 100% even after not reviewing the material for four years.



In 1982, researchers from the University of North Texas performed a three-way test on postgraduate students to see if music could help in memorizing vocabulary words. The students were divided into three groups. Each group was given three tests - a pretest, a posttest, and a test a week after the first two tests. All of the tests were identical. Group 1 was read the words with Handel's Water Music in the background. They were also asked to imagine the words. Group 2 was read the same words also with Handel's Water Music in the background. Group 2 was not asked to imagine the words. Group 3 was only read the words, was not given any background music, and was also not asked to imagine the words. The results from the first two tests showed that groups 1 and 2 had much better scores than group 3. The results from the third test, a week later, showed that group 1 performed much better than groups 2 or 3. However, simply using music while learning does not absolutely guarantee recall but can possibly improve it. Background music in itself is not a part of the learning process, but it does enter into memory along with the information learned. Recall is better when the same music used for learning is used during recall. Also, tempo appears to be a key of music's effect on memory.

 Play Handel's Water Music (Morning Has  
=Broken)

One simple way students can improve test scores is by listening to certain types of music such as [Mozart's Sonata for Two Piano's in D Major](#) before taking a test. This type of music releases neurons in the brain which help the body to relax. The effectiveness of Mozart's sonatas can be seen by the results from an IQ test performed on three groups of college students. The first group listened to a Mozart sonata before taking the test. The second group listened to a relaxation tape before their test. The third group did not listen to anything before the test. The first group had the highest score with an average of 119. The second group ended up with an average of 111, and the third group had the lowest score with an average of 110.

William Balach, Kelly Bowman, and Lauri Mohler, all from Pennsylvania State University, studied the effects of music genre and tempo on memory retention. They had four groups learn vocabulary words using one of four instrumental pieces - slow classical, slow jazz, fast classical, and fast jazz. Each of the four groups was divided into smaller groups for the recall test. These sub groups used either the same (i.e. slow classical, slow classical) or different (i.e. slow jazz, fast classical) pieces when taking the recall test. The results did show a dependency on the music. Recall was better when the music was the same during learning and testing. These same researchers did another test which restricted the changes in the music to just tempo (i.e. slow to fast jazz) or just genre (i.e. slow jazz to slow classical). Surprisingly, the results showed that changing the genre had no effect on recall but changing the tempo decreased recall.

### Healthy and Not So Healthy Effects

Many revealing scientific experiments, studies, and research projects have been performed to try and discover the extent of the power of music. Up until 1970, most of the research done on music had to do with studying the effects of the beat of the music. It was found that slow music could slow the heartbeat and the breathing rate as well as bring down blood pressure. Faster music was found to speed up these same body measurements.

The key component of music that makes it beneficial is order. The order of the music from the baroque and classical periods causes the brain to respond in special ways. This order includes repetition and changes, certain patterns of rhythm, and pitch and mood contrasts. One key ingredient to the order of music from the baroque and classical periods is math. This is realized by the body and the human mind performs better when listening to this ordered music.


One shining example of the power of order in music is King George I of England. King George had problems with memory loss and stress management. He read from the Bible the story of King Saul and recognized that Saul had experienced the same type of problems that he was experiencing. George recognized that Saul overcame his problems by using special music. With this story in mind King George asked George Frederick Handel to write some special music for him that would help him in the same way that music helped Saul. Handel wrote his Water Music for this purpose.


Another key to the order in music is the music being the same and different. The brain works by looking at different pieces of information and deciding if they are different or the same. This is done in music of the baroque and classical periods by playing a theme and then repeating or changing the theme. The repetition is only done once. More than one repetition causes the music to become displeasing, and also causes a person to either enter a state of sub-conscious thinking or a state of anger. Dr. Ballam goes on to say that, "The human mind shuts down after three or four repetitions of a rhythm, or a melody, or a harmonic progression." Furthermore, excessive repetition causes people to release control of their thoughts. Rhythmic repetition is used by people who are trying to push certain ethics in their music.

An Australian physician and psychiatrist, Dr. John Diamond, found a direct link between muscle strength/weakness and music. He discovered that all of the muscles in the entire body go weak when subjected to the "stopped anapestic beat" of music from hard rock musicians, including Led Zeppelin, Alice Cooper, Queen, The Doors, Janis Joplin, Bachman - Turner Overdrive, and The Band. Dr. Diamond found another effect of the anapestic beat. He called it a "switching" of the brain. Dr. Diamond said this switching occurs when the actual symmetry between both of the cerebral hemispheres is destroyed causing alarm in the body along with lessened work performance, learning and behavior problems in children, and a "general malaise in adults." In addition to harmful, irregular beats in rock music, shrill frequencies prove to also be harmful to the body. Bob Larson, a Christian minister and former rock musician, remembers that in the 70's teens would bring raw eggs to a rock concert and put them on the front of the stage. The eggs would be hard boiled by the music before the end of the concert and could be eaten. Dr. Earl W. Flosdorf and Dr. Leslie A. Chambers showed that proteins in a liquid medium were coagulated when subjected to piercing high-pitched sounds

### On Animals and Plants, Too!

Tests on the effects of music on living organisms besides humans have shown that special pieces of music (including The Blue Danube) aid hens in laying more eggs. Music can also help cows to yield more milk. Researchers from Canada and the former Soviet Union found that wheat will grow faster when exposed to special ultrasonic and musical sounds. Rats were tested by psychologists to see how they would react to Bach's music and rock music. The rats were placed into two different boxes. Rock music was played in one of the boxes while Bach's music was played in the other box. The rats could choose to switch boxes through a tunnel that connected both boxes. Almost all of the rats chose to go into the box with the Bach music even after the type of music was switched from one box to the other.

 Play Bach's Air on The G  
=String

 Play Strauss' The Blue  
=Danube

Research took a new avenue when in 1968 a college student, Dorthy Retallack, started researching the effects of music on plants. She took her focus off of studying the beat and put in on studying the different sounds of music. Retallack tested the effects of music on plant growth by using music styles including classical, jazz, pop, rock, acid rock, East Indian, and country. She found that the plants grew well for almost every type of music except rock and acid rock. Jazz, classical, and Ravi Shankar turned out to be the most helpful to the plants.

However, the plants tested with the rock music withered and died. The acid rock music also had negative effects on the plant growth.

## Conclusions

One cannot deny the power of music. High school students who study music have higher grade point averages than those who don't. These students also develop faster physically. Student listening skills are also improved through music education. The top three schools in America all place a great emphasis on music and the arts. Hungary, Japan, and the Netherlands, the top three academic countries in the world, all place a great emphasis on music education and participation in music. The top engineers from Silicon Valley are all musicians. Napoleon understood the enormous power of music. He summed it up by saying, "Give me control over he who shapes the music of a nation, and I care not who makes the laws" .

## To Know More

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[https://www.youtube.com/watch?v=NK2\\_bcQcoD4](https://www.youtube.com/watch?v=NK2_bcQcoD4) = best nightingale song – 3 hours.

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