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Memory for Music and Music for Memory

Since the dawn of civilization, music and remembrance have been intertwined. The way that the brain processes music is a fairly recent study, but it has been done in practice for thousands of years. Not only is how we memorize music important, but also using music helps us memorize other types of knowledge. The purpose of this essay is to describe how the brain processes music, as well as how to augment our memory through the use of music. First, I will describe how we encode music into our brain, and then I will describe how music helps us memorize other areas of information.

Remembering Music

Musical memory is dealt with by many different parts of the brain. The brain is divided into two hemispheres, right and left. The "left" brain focuses on mathematics and logical reasoning, while the "right" brain concentrates on artistic expression and intuition. This disparity between the hemispheres means that each has something different to do with the processing of music. A group of researchers studied patients with both right middle and left middle cerebral artery cuts [1]. The left middle cerebral artery cut patients could not complete tasks that had to do with musical long-term memory as well as the right middle cut patients. This led the doctors to believe that the right hemisphere facilitates access to long term musical

memory, while the left hemisphere is critical for the musical representation of the long term memory. Another group of doctors, named Sampson and Zatorre, found that a patient who had a right temporal lobectomy had a difficult time recognizing a melody without lyrics [2]. Patients with a left temporal lobectomy had difficulty in memory recognition for text, whether it was spoken or sung, but whether the patient had a right or a left lobectomy, if a song was sung with new words, the patients had problems with melody recognition. This shows that there are two kinds of musical memory codes. The verbal code utilizes the left temporal lobe, while the melodic code can use either lobe. Because encoding musical memory uses these areas of the brain, remembering music is different compared to remembering other types of material.

The memorization of music is a different kind of memorization than that of academic material. Have you ever wondered why you can not remember the year of an important battle in world history or a loved one's birthday, but you can remember all of the lyrics to an obscure pop song that you have not heard in years? This is due to the fundamental difference between procedural and declarative memory [3]. Declarative memory is your memory of facts, like an important battle or a birthday. This type of memory does not come as easy to us as procedural memory. Procedural memory, to use the old adage, is like riding a bicycle. These are skills that do not take conscious thought. According to Amherst College cognitive scientist Matthew Schulkind, remembering lyrics uses procedural memory because it is the same type of learning as swinging a tennis racket, "…you don't have to think about what comes next. You hear the first few notes of a song, and it just comes

pouring out" [3]. This becomes procedural memory because music is so strongly structured, with lots of repetition, which helps with memory. While this is why people memorize music so easily, there is time when we remember music too easily.

There are some musical pieces that people can not help but remember as they get stuck in their heads, which is a phenomenon known as having an earworm. Usually these songs are catchy because they are simple or repetitive, but they can also get stuck in one's head because the person forgets how the song ends or some of the lyrics [5]. To help to try to remember the forgotten parts, the brain plays the song on repeat, creating a loop of irritation. Earworms are more likely to occur if you are a woman, musician, or are stressed or tired. While it is easy to see how we memorize music, how music helps us memorize is a more controversial subject.

Music as a Memory Aid

Some scientists believe that music is detrimental to learning. A study done by researchers at the University of Wales preformed a study to see whether background noise and music helped memorization. Using various sounds, including music that the participants did and did not like, participants tried to memorize and then recall a list of letters in order. When listening to music, the participants' performance suffered. The researchers concluded that music is not conducive to memorizing lists that need to be in a particular order [10]. Another study shows that listening to most music will hinder your learning, but baroque and classical music will not [11]. When one listens to music with lyrics while trying to study something, the left hemisphere of the brain has to divide its attention because it is trying to interpret the lyrics. Music without lyrics and with a slow beat will activate the right

hemisphere of the brain without dividing the attention of the left hemisphere, and the brain is more effective with both parts of the brain working at the same time, so this is beneficial to studying. Music with lyrics harms one's retention if they are studying material that is different from the music, but if the lyrics are what they are studying, it is one of the best memory devices of all.

Encoding memories with music makes them easier to access at a later time. Every day, our hippocampus and frontal cortex process millions of pieces of information [7]. While putting this data in your brain is easy, retrieving the memory is the tricky part. Some theories state that we never actually forget memories, as demonstrated by hypnosis bringing out memories from childhood, but what we do have a problem with is finding these memories [12]. Music works as a powerful mnemonic device with its rhythm, rhyme, and alliteration, which is key to retrieving the information from the brain. This explains why poems, chants and songs were used to present laws, stories, and customs in the ancient world [7]. Oral forms like ballads and epics exist in every culture, originating long before the advent of written language, and it is still a very common memorization technique today. One doctor named Tapas Mukherjee, frustrated by the lack of awareness of the management of asthma in his hospital created a video of him singing the asthma guidelines, which increased the following of hospital guidelines from 45% to 100% [8]. This technique of memorization can be applied to almost any type of learning. A study just published in the journal Memory and Cognition finds that adults learned a new language more effectively when they sang the words instead of spoke them [9].

Music is so effective at retrieving memories that it can help those with damaged brains remember moments from their past.

Music can evoke memories in people with dementia and Alzheimer's. Older people with these diseases have a damaged hippocampus and temporal-parietal lobe, which is why they have trouble remembering and converting their thoughts into words. The reason why sufferers of these diseases can remember more when music from their past starts playing is because memories are stored in various parts of the brain. The primary auditory center in the temporal lobe, the frontal lobe, Wernicke's and Broca's area, the motor cortex, and the medial prefrontal cortex all are involved when one listens to a song, thus giving more access to long stored memories [6].

Music is intertwined with memory in many ways. The way we memorize it is through different parts of the brain, procedural memory, and relative and absolute pitch; we unconsciously memorize it through agonizing earworms. Music can help us memorize other material, as long as it is right type of music or the music is what we are supposed to memorize. Music can also bring back our past, even when it is seemingly gone from our mind. Music is absolutely amazing because these were not the intended effects yet it is so helpful all the same.

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