

Separation of Art and Science, that's a WAP (Wasted Academic Potential)

by Amna Tahir



"BARBARA MORGAN (American, 1900-1992). Martha Graham
'Letter to the World' (Kick), 1940" by Diversity Corner is licensed
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Vivid brush strokes, messy, refined, smooth, the expressive, yet seemingly unintentional, splotches of a Jackson Pollock, or the way Martha Graham soars through the air and defies gravity: there is no denying the importance of art in everything we see and do. The gorgeous gothic style building on a college campus was not thought up on the spot. It came from thousands of years of artistic evolution. And yet, the topic of art is always kept separate from science. In my photography class where I learned how to develop film using various chemicals, not once did I learn how those chemicals brought to life what I hoped my camera would capture. The most science I learned was to not dump the developer down the drain because it would harm the environment. While the divide began many years ago, further separation of the arts and sciences in society today might be due to the “left-brain/right-brain” theory.

Left-Brain vs. Right-Brain: A Tragic Divide

In the 1960s, a scientist named Roger Sperry was interested in learning more about the relationship between the hemispheres of the brain. He conducted “split-brain research” where he cut the corpus callosum (which consists of a bundle of nerve fibers that connects the two hemispheres of the brain¹) to see how it would affect the brain’s function.² This revolutionary experiment helped further the field of neuroscience by teaching us more about the functions of different parts of the brain.³ Through countless trials and experiments with cats, monkeys, and eventually humans, Sperry concluded, once the



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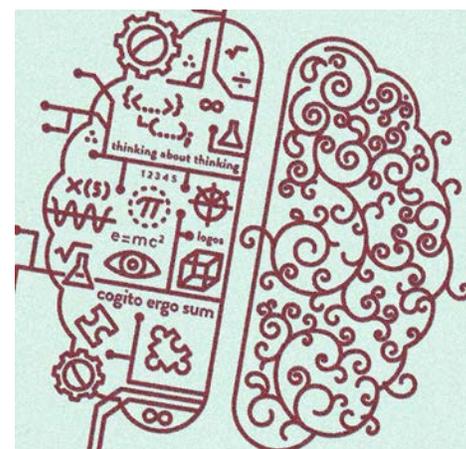
corpus callosum was severed, the hemispheres of the brain couldn’t communicate with each other.³ His research showed dominance in the left hemisphere in analytical and verbal tasks, and dominance in the right hemisphere in spatial tasks and music.³ However, the difference between the two hemispheres was extremely subtle, a point that people missed when the idea was represented to the public. So, society started believing they were more “left-brain dominant” or more “right-brain dominant,” which then led to the idea that not everyone is capable of learning math or how to paint.

From these incorrect assumptions, the arts and the sciences began to drift further and further apart. Those of us with an enthusiasm for the sciences started thinking we lack creativity and those of us with a passion for the arts started believing we couldn’t think analytically. The simple task of drawing a diagram in my chemistry class would make my classmates sigh reluctantly. However, science and art are very similar in that both evolved very

quickly, and are still evolving today. Better yet, throughout history, the two have seemed to evolve together! When scientists came up with the cell theory (that all living things are made up of cells), artists started implementing it into their art, creating creatures that combined humans and animals.⁴ If we know being “right-brain/left-brain dominant” is not accurate, we need to move away from the dated idea of believing everyone has to choose between art and science and start integrating art into the sciences. Luckily, therapists have already started to do so.

“Mental Health” Who?

In the indecisive process of trying to figure out my future career goals, I ventured into the world of mental health, which is a huge problem in today’s society. The problem is partially because a lot of people try to downgrade its importance, and partially because there is such a wide range of issues under the umbrella of “mental health”. Before all else, mental health is really important! Your brain, like your heart, is an organ, and if you are willing to find a doctor to help your heart in the event of a complication, you should be willing to do the same for your brain! Mental health may not be



“Left brain, right brain” by Mohit Tomar is licensed under CC BY-2.0

something you can physically see or feel, but it is extremely prevalent.

Let's take anxiety, for example. Imagine you are walking down an abandoned street in the dead of night. A slight, cold breeze flows by, and a few strands of hair brush your neck. All you can hear is the tapping of your shoes as you walk across the pavement and the pounding of your heart from fear. This increase in your heart rate is caused by activation in the fear center of your brain, also known as the amygdala. The anticipation of something scary lurking in the darkness causes you to experience anxiety, and this anxiety is what is activating your amygdala in the first place.⁵ It is normal to experience anxiety every once in a while, but it becomes damaging when a brain region is constantly activated. Such is the case with anxiety disorders. The region that is over-activated could begin to shrink as a way to reduce the number of neurons that are affected to reduce the negative response of stress.⁶ As a result, the degeneration of neurons can cause damage to the hippocampus,

which is involved in memory and can increase your risk of getting dementia later in life.⁶

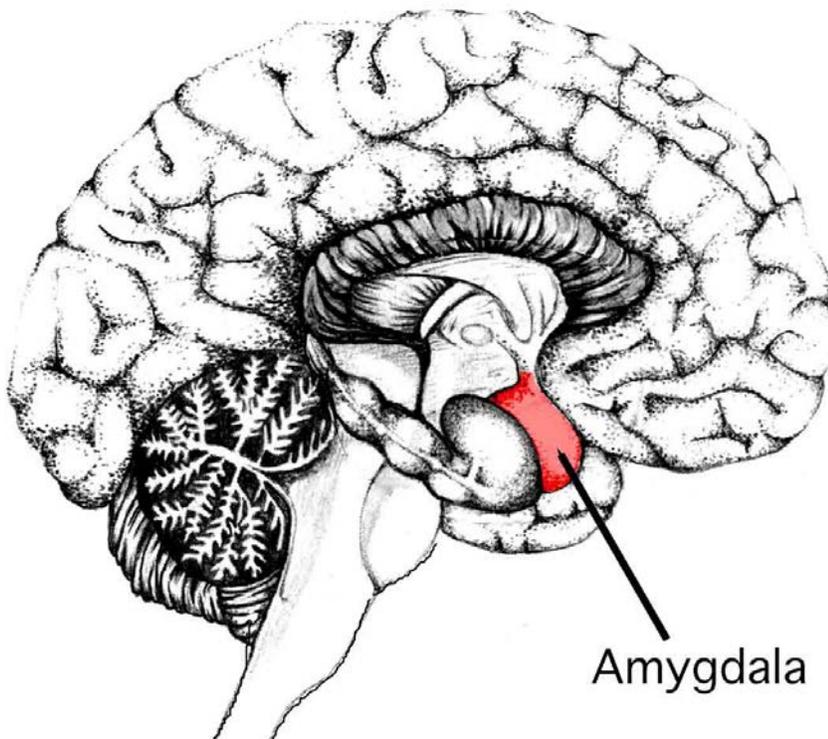
Therapy! Therapy! Therapy!

The majority of these issues have no cure as easy as taking a magic pill and suddenly feeling like everything is perfect. Sometimes it can take a combination of therapy, medicine, and a lot of self-care to start feeling like yourself again. Fortunately, there are plenty of forms of therapy that can be well-suited to your needs, one of which is expressive art therapy. Expressive art therapy uses different modes of art, such as drawing, painting, music, dance, sculpture, and photography, to help patients through trauma, growth, and stress.⁷ It is a subset of regular art therapy which uses multiple modes of art as tools to show how the patient is feeling, rather than focusing on one mode for the entirety of the therapy session.⁸

The extraordinary thing about expressive art therapy is it has been

found to work in multiple different groups of people. In 2020, a study was done by researchers looking at the biological response to art therapy in college students. They were able to reduce anxiety and stress levels after just one session. The researchers also found art-making alone didn't make as much of a difference; it was when the art-making was combined with the traditional idea of therapy that a visible difference was seen in the mental health of the students.⁹

Oddly enough, although it has been proven to work, very few people have heard of expressive art therapy. This could be because the conversations surrounding mental health have only recently started growing as people become more aware of the impact it has on society on the individual level up to larger groups. Or, it could be from a lack of overlap between the art and science community, as mentioned earlier. Either way, it has the potential to make a big impression as well as impact groups who haven't had access to therapy before. For example, in minimally and completely non-verbal communities expressive art therapy can be used because it does not require the ability to speak to work, which will remove barriers in the type of language used as an issue as well. In 2009, a study was done using art workshops to facilitate communication with children who don't speak the language of their peers. From these workshops, teachers were able to see an increase in self-esteem and communicative behaviors, like smiling and sharing their pictures with their classmates.¹⁰



"File: Amygdala.jpg" by <http://www.memorylossonline.com/glossary/amygdala.html> is marked with CC0 1.0

Art Explained Through Biology

Like almost everything else in the world, there is a biological explanation of why expressive art



Left: "Phineas Gage 1850s - Daguerrotype" by Newbury Photograph Restoration is licensed under CC BY-ND 2.0
 Right: "Harvard Medical School Phineas Gage skull" by Protocol Snow is licensed under CC BY-NC-ND 2.0

therapy works. One way to see this is by looking at the function of each part of the brain. The best way to do this? Find a brain that has been damaged, determine what area has been affected (possibly through the use of an fMRI), and then try to figure out which functions are missing. For example, we have the famous case of Phineas Gage, a man who survived a meter-long iron rod shooting through his skull and destroying a large portion of his frontal lobe. After the incident, Gage was still able to speak clearly, his memory was intact, and he was able to quickly get back to his labor-intensive job at the railroad.¹¹ However, reports from his colleagues showed that his personality changed and Gage became unpredictable and violent. It was difficult to compare his personality since there were no accounts of what he was like before the incident, but from the reported shift in his actions, we were able to learn that the complex functions

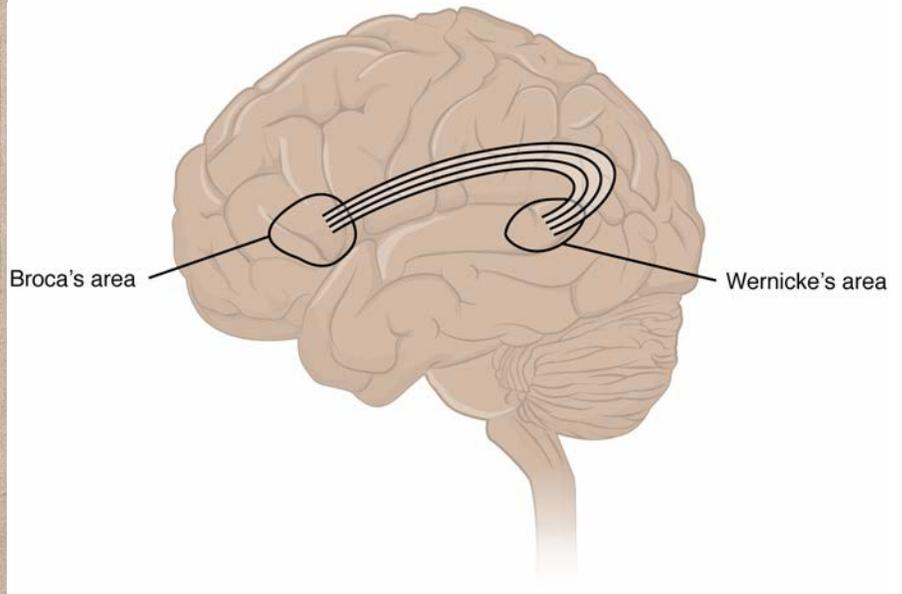
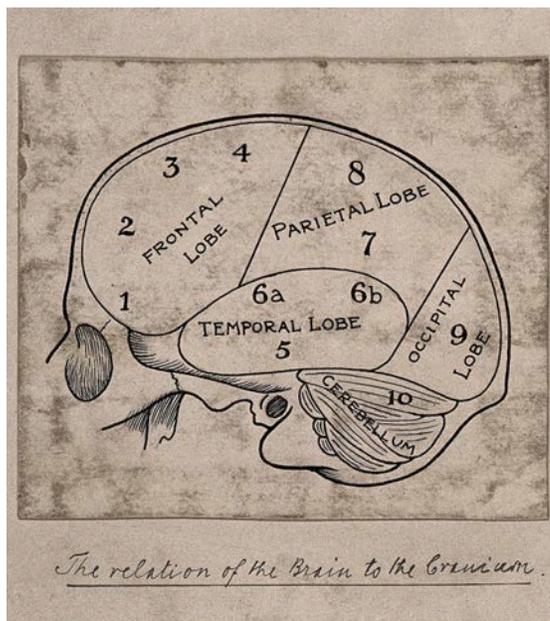
involved in decision-making and social cognition are mostly dependent on the frontal lobe.¹²

This approach of looking at the function of the brain has also been applied to creativity. When looking at artists who have suffered a form of brain damage, we can see that typically one hemisphere has suffered, and the other is in perfect condition. But, these artists can continue creating, so artistic creativity can't come from one hemisphere. Instead, it is a pathway that is connected to multiple regions of the brain.¹³ This is important because the more regions involved, the lesser the impact of brain damage. Art has been found to be a communicative system, relaying ideas and emotions in a symbolic way like languages, but unlike languages, it engages more of the brain.¹³

One study done in 2013 showed that the frontal and parieto-temporal regions of the brain are involved in broader

creativity tasks, and the front regions of the lateral prefrontal cortex are involved in combining ideas creatively, while the back region is involved in generating ideas.¹⁴ As stated previously, the frontal lobe is involved in decision making and social cognition. The parietal lobe is responsible for sensory processing which gives a person the ability to judge the size, shape, and distance of an object along with the interpretation of symbols.¹⁵ The temporal lobe is in charge of creating and saving long-term memories along with visual and auditory processing.¹⁶ The back region of the prefrontal cortex is responsible for the higher-order process of regulation of the selection of multiple responses and conditional operations. The frontal region plays a huge role in cognitive control.¹⁷

It is clear why these brain regions are involved in the process of creativity and art-making, but it is even cooler to see the



Left: "File:Anatomy of the brain; lobes and cerebellum Wellcome V0009499.jpg" is licensed under CC BY 4.0. Right: "File:1605 Brocas and Wernickes Areas-02.jpg" by OpenStax College is licensed under CC BY 3.0

overlap of these brain regions in communication and therapy. There are two main brain regions involved in language in the brain: Broca's area and Wernicke's area. Broca's area is mainly linked to the production of speech and the articulation of language and ideas and is found on the frontal lobe. Wernicke's area is connected to Broca's area and is associated with language processing and comprehension, for both written and spoken, and is a part of the temporal lobe.¹⁸ These two regions are a part of the same areas involved in the creative process, which further connects using art as a form of communication. But how does this connect to therapy?

Flexibility in Art Therapy

The special thing about therapy is that it can be designed to fit the needs of each individual. So, in the case of expressive art therapy, different modes of art can be used to further the communication between the patient and therapist. Being able to comfortably express your feelings in a session that is tailored to your specific needs

can help the therapist find ways to lessen your mental health issues more effectively. The main goal is to find alternate ways to fully communicate how you feel to the therapist, so the therapist can find ways to combat those feelings through stress-relieving activities. Then you apply those activities at times when you are feeling stressed.¹⁹ An example of this could be painting to relieve tension from a long day of work.

Of course, as amazingly effective as art therapy is, it can only work to an extent. There are limitations to all forms of therapy, and usually, those limitations depend on the patient and their willingness to engage with the activity and apply what they learned to their day to day life. But, once the participant is fully engaged, they might even be able to see a change as early as their first session. Because of its interactive nature and since it doesn't require a knowledge of the spoken word, expressive art therapy can be used with small children or adults, and can be done one on one with the therapist, or even in a group setting. Art therapy has been used with cancer patients to help promote

self-esteem and develop a form of identity that is not linked to their disease. It also provides a way to make a physical record of thoughts and feelings that the patients had difficulty expressing verbally.²⁰

Unlike other forms of therapy, like cognitive behavioral therapy which is used pretty often, expressive art therapy is not as well known. So, there are a lot of areas for advancement. Without the need for a verbal component, expressive art therapy might be able to relieve some stress in the Autism Spectrum Disorder (ASD) population, especially with children who have less experience being around new people. Since ASD causes difficulties in social situations,²¹ a child with ASD might feel stressed when surrounded by unfamiliar people, which has been found to lead to an intense emotional response, such as a "meltdown".²² Art therapy would have the ability to lower or decrease the distress the child is experiencing. If something as exciting as expressive art therapy and all of its possibilities comes from integrating art and science in just one field, just imagine how many possibilities there are in other interdisciplinary fields.

Be Haste Don't Waste!

Separating art from science can be damaging in many ways. Major discoveries in the sciences are what lead to such great developments in the things we enjoy! Through the understanding of sound waves, we know how to make music more appealing to the ears. The invention of microscopes is what led artists to realize the multitude

of ways to view the world!⁴ Students would get a more well-rounded education from taking classes that allow them to respond creatively and encourage outside-the-box thinking. Alternative perspectives in the lab can help further scientific research in ways that have not been done before. Although the fields have been kept separate for so long, combining art and science can be helpful, especially in trying to understand how someone feels.

Our main objective is less about science and more about how we can use this creative form of expression to really make a difference in a person's life. Art and science evolved together and should therefore be regarded, not as two separate entities but as two foods that taste great by themselves, but even better united. Otherwise, all we have is some wasted academic potential. ■

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