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## **Art Therapy: The Visual Spatial Factor and the Hippocampus** (2<sup>nd</sup> Revision December 14, 2010)

Psychotherapy is talk therapy. In psychotherapy, there are no motor functions required to participate. However, the use of motor and sensory functions in a therapeutic process can actually help to stimulate important parts of the brain, and, thereby, facilitate involvement in the therapeutic process more easily, more naturally, and more fully, as with art therapy.

Traditional art therapy also uses talk therapy, along with visual/motor/sensory functions to help the client move easily into brain function, via visual/spatial/motor/sensory involvement. Art therapy is coming into its own, these days. A brief search of the Internet will demonstrate this fact. Using the arts in psychotherapy is an emerging field that has gained national and international acceptance. What is not as well known is how the special applications of Del Giacco Neuro Art Therapy (DAT) -when combined with neuroscience findings - is of great value to many people with a wide variety of problems.

The specialty of Del Giacco Neuro Art Therapy (DAT) offers all of the components of psychotherapy and art therapy, and is designed to be supported by neuroscience's emerging views of neuro-plasticity. One could argue that all therapeutic processes are supported by the potential for neuro-plasticity. However, the DAT process is designed to have direct effects on the primary brain regions that deal with emotion and cognition, primary motivators for shifts in behavior, with corresponding neuro-plasticity.

For example, DAT approaches can help with numerous types of developmental and psychological issues such as anxiety disorders, major depression, and PTSD. DAT can just as effectively have immediate effects on attention deficit disorder and learning disabilities. Clients with PTSD can connect to their traumatic experiential losses and express themselves easily. Another example would be someone with a learning disability: after using the DAT process, they may suddenly spark into a level of attention that was not possible prior to using the DAT arts-based method.

In addition, many neurologically based problems can be helped with the DAT

process. Some of these are: traumatic brain injury, stroke, Alzheimer's disease, and brain tumors. One such client with Alzheimer's disease had been functioning at lower levels of consciousness, after a few therapeutic sessions the client seemed to "wake-up."

He became more aware, his thinking became clearer, he started to interact socially, became more aware of his environment and slowly over time his overall quality of life improved.

The DAT method is designed to specifically work within the limbic system. This type of work is done for three reasons 1) to rebuild brain pathways, 2) to relieve stress and 3) to provide cognitive rehabilitation. Each of these brain functions are believed to occur within the anatomy of the limbic system. There are several major components to the limbic system and other less known sub-systems. In this article I will discuss two parts of the limbic system, the amygdala and the hippocampus.

The amygdala is known for the part it plays in our emotions and the hippocampus is acknowledged for its involvement with memory. Both the amygdala and the hippocampus are dependent on sensory processing and decoding information occurring properly. However, if these two parts of the brain become compromised, either from long-term stress or disease, chemical changes that damage neural networks occurs. As the brain's chemical processing becomes altered, so does the anatomy of the limbic system. Perhaps, it is then the way we experience ourselves and the way we know the world that can seem to change. For example, in depressed people the hippocampus has been shown to shrink 10 to 20 percent. These changes can also lead to negative affects on memory and the inability to handle everyday stress. (Robert Sapolski, Taming Stress, Scientific America, 2003.)

In the case of Alzheimer's disease, the hippocampus is the first area to experience negative anatomical changes. When changes to the hippocampus occur, the person is less likely to comprehend shapes, learning becomes problematic and memory problems are not far behind. Needless to say, while these negative anatomical and chemical changes are occurring, stress roars its ugly head and gains our awareness by causing anxiety to occur more frequently. At this stage, we may visit a doctor and their typical response is to recommend medication to help us cope. However, behavioral work with an arts based DAT approach can train a person for the life skills needed for everyday life.

Each DAT therapeutic application is designed to work specifically within the limbic system. Since we know that significant sensory processing occurs within the

limbic system, and that neuro-plasticity encourages the act of regeneration, it would follow that using sensory stimuli via color, visual/motor and spatial exercises would help to rehabilitate the hippocampus's ability to grow and change in shape helping the brain to generate new pathways.

As an example for the use of spatial exercises in rehabilitation, Neuro-surgeon Dr. Mark Vernon designed abstract shapes as cognitive rehabilitation exercises and mentioned the visual spatial exercises that are helpful for memory restoration. Brain Power, Mark Veron, 1989.

In addition, Dr. Richard Haier a psychiatrist from the University of California-Irvine completed several complex visual spatial clinical studies incorporating visual complex motor tasks. These clinical studies demonstrated increased involvement in the limbic system in the areas connecting to attention. Plus, a significant increase in IQ was noted for successful participants. (Haier, J. Richard, Siegel, Benjamin, Tang, Chuck, Abel, Lennart, Buchsbaum, S. Monte, 1988.)

Although Haier's studies were done within the context of a video game, the study also documents the use of graphic arts. Additionally, the participants of the study used motor functions to solve complex visual spatial problems. The geometric designs had color and shape that required deciphering placement in a space for accuracy.

The graphic arts in Haier's study used shape, color and visual/motor movement in the same manner that we use them in the DAT process. Therefore, it could be concluded that Haier's study inadvertently provided us with important information for the DAT Neuro Art Therapy method. I believe, when we are using our hands in an exercise and requesting the visual brain to translate the meaning of shapes, we stimulate the limbic system. These neuro-dynamics may be a significant reason for the amount of changes occurring in the limbic system during these studies and in the generally positive responses to the DAT interventions.

More advanced thinkers like Eleanor A. Maguire, a professor of Cognitive Neuroscience at the University of London mentions in her study of taxi drivers that the hippocampus is the seat of spatial reasoning, memory planning for the future and is located in posterior hippocampus-the spatial processing center. Let's recall that the spatial processing center is the first to be disturbed in Alzheimer's patients and often causes reasoning and planning to decline. It would follow that a program designed to work within the hippocampus and the limbic system-such as DAT-would be of primary benefit to reestablish functions within the visual spatial center of the brain.

Maguire is quoted as saying that these findings “May have relevance for helping design better rehabilitation programs for cognitive impairments and improving memory in the elderly.” What I have found in my practice, is when a client begins the interpretation process-hippocampus stimuli-of the Therapeutic Drawing Series it is then that the seemingly magic happens; the client reconnect to cognition, the clients awareness is there and critic thinking ensues as the developmental process continues in our therapy sessions.

For a more formal explanation of the human brains capacity to process spatial information or the VSE factor Marian Tsanov and Dennie Manahan-Vaughan provide us just what is required in their article *Synaptic Plasticity from Visual Cortex to Hippocampus: Systems Integration in Spatial Information Processing*. These fine authors are from the international Graduate School of Neuroscience and Medical Facility, department of Experimental Neurophysiology, Medical Facility, Ruhr University Bochum, Germany. “In this review, we summarize recent findings with regard to the expression of dynamic synaptic plasticity in the visual cortex and how this plasticity may influence information processing in the hippocampus. Tsanov and Manahan-Vaughan state in their article that the adult cerebral cortex possesses the remarkable ability to change its neuronal connectivity through experience, a phenomenon termed “synaptic plasticity.” Synaptic plasticity constitutes a cellular mechanism that is thought to underlie information storage and memory formation in the brain, and represents a use-dependent long-lasting increase or decrease in synaptic strength. Recent findings, that the adult visual cortex undergoes dynamic synaptic plasticity that is driven by active visual experience, suggest that it may be involved in information processing that could contribute to memory formation. The visual cortex provides a crucial sensory input to the hippocampus, and is a key component for the creation of spatial memories. An understanding of how visual cortical neurons respond with synaptic plasticity to visual experience, and whether these responses influence the induction of hippocampal plasticity, is fundamental to our understanding of the neuronal mechanisms and functional consequences of visuo spatial information processing.”

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In Summary:

In the writings related to neuro-plasticity, we are shown that changes in the brain can occur with repeated use of sensory stimuli, with both visual and motor interventions. Keeping these important scientific contributions in mind, I will briefly summarize why the choice of the arts-based DAT method of psychotherapy over traditional verbally based therapies for emotional and cognitive treatment, may be advised.

The DAT Neuro Art Therapy process is designed to work within the areas of the brain that are initially affected by stress and memory loss: they are the amygdala and hippocampus. The benefits from DAT are accomplished by using stimuli from color, abstract designs for complex mental processing, and visual /motor movement to help more parts of the brain become involved in the overall recovery process. It would follow that Del Giacco Neuro Art Therapy, used in a developmental approach, would be of significant benefit to those who need psychotherapy and memory rejuvenation. The applications of the DAT approach vary from client to client and therapist to therapist. The process is flexible and highly adaptable to each person's needs. It would follow then, that the DAT methods may be a hidden treasure to a multitude of clients who experience cognitive deficits and emotional challenges.

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Synaptic Plasticity from Visual Cortex to Hippocampus: Systems Integration in Spatial Information Processing, MARIAN TSANOV AND DENISE MANAHAN-VAUGHAN  
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