

### Final Paper DAT Cognitive Art Therapy System

Del Giacco Art Therapy is a cognitive art therapy process that focuses on stimulating the mental sensory systems and working to stabilize the nervous system and create new neural connections in the brain. This system was created by Maureen Del Giacco, Phd. after recovering from her own traumatic brain injury and is based on extensive research of neuro science concepts and observation of brain trauma victims and dementia patients and their recovery.

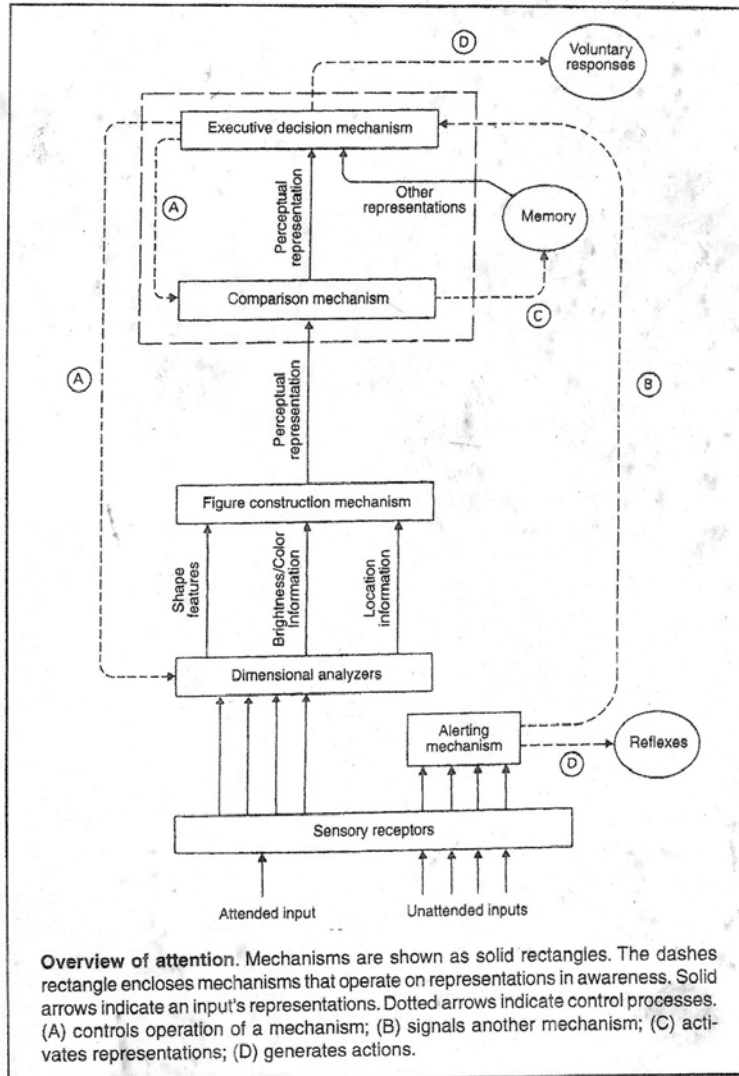
Neuro-science has demonstrated that brain tissue is able to respond to damage or loss of neurons such as might happen in the event of a stroke, dementia or traumatic brain injury. Studies show that appropriate repetition of mental activities can stimulate the growth of new dendrites and refine some connections between neurons. If the “cell body” of the neuron is intact it can re-grow. If not nearby neurons can be “trained” to take over the role of the destroyed ones.” (DAT course)

In the DAT system we are primarily focused on the visual system. Here the input is taken in through the eyes, becomes electro chemical, travels via the optic nerves to the visual cortex at the rear of the brain and then to other areas which interpret the incoming images. This is a process called “dimensional analysis”. In other words the images are initially taken in as shapes and must be interpreted to determine what one is observing. This is done in areas of the brain that compare the input to previously seen imagery. (The hippocampus for example, deals with memory). (Probably “mirror neurons” are involved). see Ramachandran

The DAT system has a set of core concepts consisting of the use of color, line and design. The system is very effective at stimulating the lower mechanisms of attention which are at the root of all intake of sensory input. The goal of the Del Giacco process “...is to strengthen the two lower mechanisms of attention, that is to say, the dimensional analysis function and figure construction mechanism which will ultimately enable the ability to connect with top down cognitive processing.” 4

As we know from the overview of attention chart (below), attended inputs and unattended inputs are taken in by our sensory receptors. The information enters the “older primitive” areas of the brain, including the limbic system which has a role in emotions. They are passed upward to alerting mechanisms and dimensional analyzers. From the analyzers, brightness, color, shape and features are processed. Figures are “constructed” enabling the brain to perceive a representation of the object. Comparisons are made to previously seen objects and then up to the executive areas of the brain which enables us to respond to the stimuli (top down) A description of bottom up processing is that it begins with visual input then brightness, contrast, and figure-ground is discriminated. The darker areas are seen as figures, the lighter as ground.

The Del Giacco system is based on these neurological concepts of “bottom up” and top-down” processing. leading towards efficient parallel processing. In this parallel process, the bottom up and top down process occurs simultaneously and efficiently. After the information reaches the executive areas of the brain they process it, send directions back down to areas that control muscle movement etc. All of this occurs at high speed in the normal brain. If an injury occurs and creates a block to this process then function is disrupted, muscles don’t work, memory is lost or areas of vision may be compromised.



Focusing on visual perception we find that there are five areas of perception. Position in space, spatial relationships,. Perception of constancies, like size brightness and color. Visual-motor coordination and perception of figure-ground relationships. (from Mary Bolles, Light Years Ahead)

All of these processes relate to creating artwork. When an artist creates an artwork all of the previously mentioned processes are in play. Our brain must function efficiently to enable us to choose which colors to use, how to place objects or shapes on a paper or canvas so as to create the effect we want. This may come as second nature to an artist, but to someone whose brain does not work efficiently these “decisions” can be difficult if not painful. The hierarchy of attention has been disrupted by either damage to the brain or perhaps in a child the brain did not develop in a way to allow this process to go smoothly.

All of this normally occurs at high speed in the brain. If an injury occurs and creates a block to this process then function is disrupted, muscles don't work, memory is lost or areas of vision may be compromised.

### Beginning the DAT Process

The process of working with a patient consists of a series of steps. It begins with assessing the client's mental status through a specific series of questions. Background information is also gathered on the patient's history, nature of the injury, including information from medical personnel if possible. We always proceed slowly and carefully so as not to stress the patient unduly.

When we assess the state of our client we are looking to see whether he /she is depressed, anxious, tired etc. We are always careful not to overstress a client during the course of any assessment. TBI patients (as well as children with deficits) are often fragile and we do not, for example, want to cause a seizure or raise anxiety too much by working to fast or intensively.

If the patient presents as depressed or in need of serious psychotherapy, (beyond our own ability to treat) or needs psychiatric help we should be sure that this patient has these needs addressed before we begin our own process. An art therapist might focus on allowing the patient to express their strong emotional feelings through art activities. A TBI patient has suffered a “loss” whether of self -esteem, sensory input, ability to be self -sufficient, memory etc. This can be disorienting, anxiety provoking, frustrating and lead to shame and depression. These issues must be addressed before our work and healing can begin.

There are three phases used in working with a client while playing Tetris (or another game). We always begin the work with relaxation and a warm up exercise. This is done with meditation or other relaxation techniques, then with a game such as Tetris. Studies have shown that playing Tetris positively effects the glucose levels in the brain. (2) This game works on visual memory and attention, as the user tries to fit the moving shapes into one another to form complete “walls” one atop the other. While engaged in this exercise we are very observant of the patient’s reaction, so as not to over stimulate or overload the delicate neural pathways in the damaged system.

We begin with “passive” followed by semi-active, then active. In the passive format the therapist may do the “work” while the client observes, then the client may be able to do the work. Next is the semi-active phase where the client does the work. In the active phase the client is more engaged in the work and may direct the therapist. This process will vary depending on the condition of the client. A stronger client may be able to skip the passive phase, while a more compromised one may need more passive and semi-active work.

As a therapist we must always be in “tune” with the mental and physical state of our clients. We need to be aware of any sign of neurological distress, such as glassy eyes, poor motor function, slurring of words. This would be indicative of a shut down in the “top-down” part of the mental process. Therefore we would not ask the client to engage in analytic work but would have them relax, meditate etc. so as not to further distress the client.

The Therapeutic Drawing Series created by Maureen Del Giacco consists of a group of abstract color drawings, progressing from a simple group of shapes to more complex ones. The patient will be asked to reproduce these using oil pastels. Again there are three levels of this activity. First is passive mode in which the patient may observe the therapist demonstrating the drawing process. (Utilizing bottoms up process) Then they can copy without looking at their own paper and not be concerned with a precise reproduction. Next is semi active. They draw while looking from the original to the copy. Last is active. (Utilizing more analytic mental processes). Using rulers etc. to be most precise in the reproduction substituted for the actual drawing process.

This process involves use of vision, visual-motor skills, color recognition and spatial recognition and attention. Various forms of art media may be utilized for this depending on the needs, abilities, and preferences of the patient. In some instances a patient will not physically be able to draw and will therefore be given a set of cut out shapes to arrange in a pattern matching the provided pattern. Others may be better able to manipulate three-dimensional objects or create sculpture. The important idea is to utilize visual-spatial activities in order to stimulate the creation of new brain pathways around damaged areas.

This process cause the brain to “fire” in many areas and for the right and left hemispheres to communicate.

Color and affect are areas that art therapists are taught about. For example, some colors create relaxed feelings in the observer, others anxiety. In traditional art therapy we may analyze a patients work based in part on their choice of colors. The DAT system focuses on the effect the color has on stimulating the sensory systems in the brain so as to help create new neural pathways around the damaged areas which have been become unable to transmit information. (The visual cortex is one of the largest areas of the brain and for sighted people is crucial to processing vast amounts of information and is how we tend to be aware of our surroundings, our ability to read, interpret the expressions of other people, socialize, etc.) A breakdown here will effect our entire quality of life.

### Neglect

In some TBI cases the patient is completely unaware of an object to one side of him. (Or even the left side of his own body). When this occurs on the persons’ left side it is called “neglect”. This phenomenon is caused by damage in the right half of the brain. The right side of the brain controls physical processes on the left side of the body. For example our optic nerves cross the brain from right eye to left visual cortex and left eye to right visual cortex, so damage to one side can eliminate processing of visual sensory input to the opposite side of the brain. The eye can “see” but the brain cannot process the information. Therefore it is as if the patient has lost sight to their left. This process affects both visual as well as other sensory input depending on the area of damage. (Some neuroscientists have used mirrors to “trick” a patient’s brain into believing it is “seeing” the "neglected" side and thereby stimulate both sides of the brain) 1.

## Working With ADD

Some children may have attention deficit disorders. (ADD) They cannot easily control the sensory inputs, can be overwhelmed by noise or visual distraction which others can screen out. They are unable to remain focused while in a classroom, for example. Other children can have difficulty picking up visual social cues from their peers or adults. In these cases we may find that they misread another persons intentions and then react based on this misreading. They may have difficulty creating or maintaining friendships. (They may be on the autistic spectrum).

When we are attempting to restore the sensory afferent pathways the following is occurring in the brain:

Stimulation from the DAT process; input to neuro-transmitters and to sensory receptors simultaneously; those two areas “communicate”; the sensory receptors send information to both the thalamus and the Limbic system for integration; from here each system sends information to the cerebral cortex. Here it is processed and higher cognitive functions occur allowing for developmental improvements.

The child’s sensory inputs travel through the limbic system. This part of the brain deals with the control of emotion. In order for the person to remain stable the brain must be able to control the continuous processing of the incoming information. At the same time the neuro-chemistry must be balanced in order for neurotransmitters to “fire” at the most



effective speed. In some children there is a neuro-chemical imbalance which causes Attention Deficit Hyperactivity Disorder. (ADHD).

In this case the neurons are not firing fast enough to allow the child to control impulse or physical movement. Medications can help this by increasing the firing rate. At the same time the “wiring” of their brain may not allow for efficient passing along of information.

The use of the DAT system can be incorporated into treatment of these children. If we can improve their ability to interpret incoming visual input by repeated stimulation of their processing centers in a gradual way then their symptoms can be reduced. We can also work on their attentional ability through the use of mechanical stimuli like Tetris. According to Haier’s study playing Tetris increases the amount of glucose in the primary memory area of the hippocampus area of the brain. There were also decreases in glucose metabolic rate effect in the cortical regions. The result of this change was an increase in IQ and in attention.

In one study the researcher used the “Captains Log” computerized system to increase attention and reduce ADHD. The computer based “games” are similar in some ways to Tetris and other games used in DAT. They encourage the patient to stay focused on the objects on the screen in order to score “points”. This causes the brain’s neurons to fire repeatedly which then makes those connections stronger and more efficient. These studies showed measurable improvement after 35 sessions.

In some cases we work with children who have a poor sense of where their body is in space. This indicates a lack of coordination between the input from the two eyes and perhaps a flaw in input from the muscles. The visual-spacial aspects of the DAT system

are applicable here as well because of our focus on stimulating many areas of the brain simultaneously so as to achieve better parallel processing and thereby improve ability to deal with one's spatial awareness.

### Stress and anxiety

When a person is stressed or becomes anxious there is a release of the chemical epinephrine in the brain. The adrenal glands secrete cortisol, a glucocorticoid which effects the metabolism of glucose. (a sugar). This can be a useful reaction when we need to wake up or prepare for "fright or flight". For some people external input can bypass the cortex and go straight to the amygdala without the person being conscious of what triggers this. They suffer anxiety attacks. When this occurs too often it takes a toll on our body and brain. Blood pressure increases and muscles tire. Over time the hippocampus is affected negatively and the ability to learn and memory can be reduced. Brain exercises can counter some of this damage to the hippocampus and amygdala.

Relaxation exercises also are important means of lowering stress and we should use them in our work. Examples would be meditation, softened lighting and relaxing music.

### Working Memory deficits in children

Sometimes we work with children who have limited working memory. In these situations the child cannot retain information presented long enough to process it and act on it. This indicates a deficit in the medial temporal lobe including the hippocampus. The neurons are not getting enough dopamine and glutamate. This problem can be addressed by using repetition of input. We need to increase the strength of synaptic responses. "...a long lasting increase in the strength of a synaptic response occurs following stimulation."

(p 18 DAT section 2) Therefore repeated stimulation using art activities and Tetris type games should gradually benefit this patient as well. The Haier Tetris study also suggested that there could be an effect on working memory after using this form of visual-spatial stimuli.

This DAT process was interesting to study and gave me some further insights into what may be happening in the brains of the children with whom I currently work. I may be able to utilize it in the groups to some degree although the children are primarily focused on using the art materials and expressing their inner feelings. Knowledge of this system also gives me some ideas for future work with other populations, whether geriatric, PTSD, or TBI.

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***ADD/ADHD* Neurocognitive Enhancement  
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