

## Infatuation or Terminal Love

BY RON J. SWATZYNA, PH.D., L.C.S.W.

This country has been engaged in a national debate about whether violent video games breed violence in those that play them. I don't know the answer to this question and I am not even certain that it is the right question to ask. Instead, I would like to ask another question: do "thrilling" video games alter the brains of those who play them over extended periods? Recent studies on brain functioning suggest that the answer to this question is, yes, thrilling video games do alter the brains of those who play them, and not for the better.

Throughout this article, I will refer to "thrilling" video games rather than "violent" video games. I do this for two reasons. First, violence has a moral connotation. Some believe violence is bad in its own right; others might embrace it as a necessary evil in an imperfect world. I will sidestep this part of the debate because what makes games dangerous isn't the violence, per se, it is the intensity of response the violence engenders. Second, I use the term "thrilling" because games that put you in the role of a snow boarder careening down a slope might be just as dangerous as games that put a gun in your hand and a mugger in your sights.

Many parents would much rather have their children play video games in which they race around a track rather than shoot at monsters. From the point of view of brain functioning, there may not be much difference between the two.



To understand how thrilling video games alter the brain, it's necessary to understand how the brain works. The brain is a learning machine which changes in response to what it learns, continually creating new neuronal pathways. This process is called neuronal plasticity. The more an activity is repeated, the stronger the neuronal pathways associated with it become. This process is commonplace. We all experienced it when we learned to swim or to ride a bicycle. At first it was very hard, but the more we did it, the easier it became. Repetitive activity

strengthened and expanded the neuronal pathways so that in time, the skill was forever embedded in our brain's programming. This ability of the brain gives us the ability to learn new things at any age and also gives neurofeedback training the capability to normalize otherwise dysfunctional brain activity. Through repetition, neurofeedback helps the brain train itself to function more smoothly and to avoid disruptive brainwave patterns.

Thrilling video games create disruptive patterns. Through much repetition, those changes become deeply embedded in the brain. The purpose of this article is to present empirical findings specific to the neurological impact of heavy video gaming. Before discussing just how video games create changes in the brain, one point must be made; all video games are not created equal.

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*The FDA has recently recommended that a warning be included on the labeling of stimulants used to treat ADHD. This issue contains an article by Dr. Jay Tarnow that examines the risks associated with stimulants and the risks associated with untreated ADHD. This article was written before the recent FDA announcement but addresses many issues raised by the FDA.*

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## Video Games

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### Continuum of Video Games and Technology

The video game industry is very prolific. Over the last 10 years, we have seen an almost exponential growth in the types of games and in gaming technology. We have come a long way from Pac Man. There is a continuum of video games. At one end are those that stimulate the learning pathways and on the other those that stimulate the limbic system. The limbic system is responsible for preparing the body to fight or flee in case of threat (survival). Video games such as Sim City teach players skills such as organization, planning and strategizing. In contrast, video games, such as Doom and Quake, highly stimulate the limbic system.

Instruments that play video games have kept pace with the games themselves. With technologically advanced graphics, displays and controllers, thrilling video games have become very realistic. Superior graphics make the games very lifelike and therefore proportionally increase the stimulation of the player. The greater the stimulation, the greater the emotional arousal, even though the player knows cognitively that it is just a game.

### Neurochemical change

There are two important neurochemicals produced in high quantities by video gaming: norepinephrine and dopamine. The first is associated with the fight or flight response, the second directly stimulates the pleasure centers.

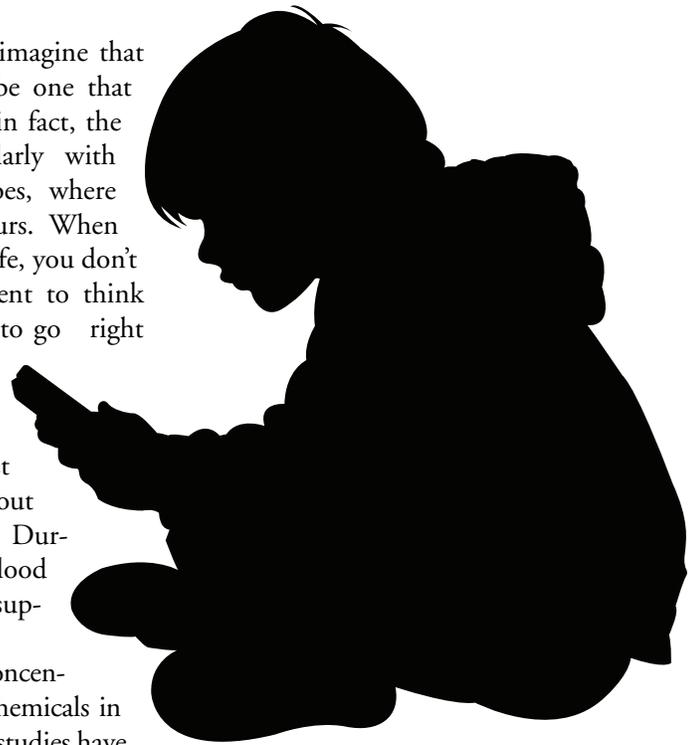
What makes video games so exciting is that on some level they feel real, and to the brain, in a sense, they are. In a situation of real danger, the brain tells the body to get ready for action. It floods the body with adrenaline, the respiration rate increases, blood vessels constrict, and the heart rate and blood pressure increases as adrenaline is released into the brain.

Intuitively, we might imagine that the survival state would be one that powers up the brain, but in fact, the opposite occurs, particularly with regard to the frontal lobes, where higher-level thinking occurs. When you are running for your life, you don't want to stop for a moment to think about whether you ought to go right or left. That moment of hesitation might cost you your life. Instead, the brain tells the body to just MOVE, don't think about how or where, just do it. During an adrenaline rush, blood flow to the frontal lobes is suppressed.

In addition to high concentrations of fight or flight chemicals in the brains of video gamers, studies have also found significant quantities of dopamine. Interestingly, the presence of dopamine is reliable enough that researchers looking to track dopamine in the brain, have used video games to stimulate its production. It is produced in response to the goal-seeking activities that are a component of most video games. Our bodies produce dopamine when we are in pursuit of a goal. That is our body's way of helping us to stay on track with a pursuit, because dopamine directly stimulates the pleasure centers of the brain. Once the goal is attained, dopamine production drops off. But, as we know, behind every goal in a video game is yet another goal waiting to be achieved, so the flow of dopamine is continuous.

### Neuroelectrical Changes

Both excessive quantities of dopamine and the presence of the fight-or-flight chemicals cause reduced blood flow in the prefrontal cortex, reducing neuronal activity in that part of the brain. This reduction in blood flow is manifested by an increase in slow wave activity and a decrease in fast wave activity in the prefrontal cortex. Studies using functional MRI and EEG analysis find that people playing thrilling video



games consistently display this brain wave pattern.

The increase in slow wave activity is apparent in the dissociated state in which most people play video games. They are submerged in the imaginary world; for gamers, it is as if they are truly in the game and real life ceases to exist. Many parents report that they have great difficulty getting their sons' attention when they are gaming. This is why.

Decreased fast-wave activity while playing video games is not unexpected because the structure of most thrilling

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#### TARNOW CENTER

#### MISSION STATEMENT

*To offer a Center of Excellence in the Southwest Region, providing innovative, superior quality therapy, while utilizing an interdisciplinary team approach to assessment and intervention for individuals and families affected by psychiatric, psychological, developmental, learning, and language disorders.*

# The Side Effect of Not Treating Adult ADHD is the Most Serious Side Effect of All

JAY D. TARNOW, M.D.

With many disorders, not just ADHD, patients and physicians must decide whether a particular medication is worth taking. It can be a challenging decision.

One must answer the question, is this medicine likely to provide relief. There is no point in risking any side effects if the medicine is not going to be helpful.

Consideration must be given to the individual history of a patient to determine if there are particular vulnerabilities that would heighten the likelihood or severity of any side effects. If a medicine has a small potential to cause stomach upset and a patient has a history of ulcers, that potential side effect might render the medicine inappropriate for this patient.

Finally, one must balance the potential side effects of a medication against the potential consequences of not treating the disorder at all. For example, a drug that has a 15% potential to cause liver damage would not be considered a very good choice if you were trying to cure a nagging headache. However, the same potential side effect might be considered tolerable if the disorder being treated had a 95% chance of killing the patient if left unchecked.

## Consequences of untreated ADHD are underrated

There are a variety of medicines effective for treating adult ADHD. While there are some potential side effects, they are, for the most part, not severe and are easy to manage. Given these facts, it should tip the balance towards these drugs, however there is still a significant number of adults with ADHD who are reluctant to treat their disorder medically and also a number of health profes-

sionals who are reluctant to recommend medical treatment for ADHD. I think the reason for this is that people underestimate the impact of leaving ADHD untreated.

In this article, I will discuss the drugs available for treating ADHD and will also examine the consequences of not treating the disorder.

## ADHD is a serious and prevalent adult disorder

ADHD is a serious disorder and it is not likely that children will simply "grow out of it." Two thirds of children with ADHD become adults with ADHD. Often the hyperactivity diminishes, but other symptoms persist with very negative consequences. It is estimated that 4% of adults in the general population have ADHD symptomatology. Most of these people are undiagnosed. Further complicating the situation is the fact that untreated ADHD usually results in a host of comorbid disorders. This makes diagnosing the underlying ADHD that much more complicated. However, the presence of comorbid disorders also makes the consequences of untreated ADHD that much more serious.

Adults with ADHD have lower educational attainment levels, have great difficulty obtaining and maintaining employment, have more interpersonal relationship problems, earn less, and are admitted to the medical emergency room more often than those without ADHD. They demonstrate greater healthcare utilization overall. Adults with ADHD report that they have a poor outlook on life and feel they don't fit in with their peers. They are more likely to be divorced.

Adults with ADHD change jobs more frequently and have significant differences in workplace performance than adults without ADHD. Estimates of the average loss of household income per adult with ADHD ranges from \$8,900 to \$15,400 per year. The aggregate loss in household income made ADHD one of the costliest medical conditions in the United States, with estimates ranging from \$67 billion to \$116 billion annually.

Untreated adults with ADHD have a higher incidence of car accidents. A study looking at 15-25 year olds with ADHD showed that in simulated driving tests, those who were medicated with Adderall XR or Concerta experienced fewer collisions, had improved crash avoidance ratings, demonstrated longer

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## Consequences of untreated ADHD:

- Lower educational attainment
- Difficulty obtaining and maintaining employment
- Increased interpersonal problems
- Reduced earnings
- Increased emergency room admissions
- Greater healthcare utilization
- More likely to be divorced
- More likely to suffer from depression
- More likely to suffer from anxiety
- More likely to have traffic accidents
- Twice as likely to smoke cigarettes
- Six times more likely to suffer depression
- Twice as likely to abuse alcohol.
- Four times more likely to have sexually transmitted diseases.



time to collision, had fewer drivin-out-of-lane occurrences, and tailed less.

Adults with ADHD are twice as likely to be smokers, six times more likely to suffer depression and twice as likely to abuse alcohol. They are four times more likely to have sexually transmitted diseases.

### Stimulants are one category of medicine approved to treat ADHD

There are essentially two categories of medicines presently approved to treat ADHD: stimulants and Strattera (a selective norepinephrine uptake inhibitor). In this article, I will focus on the stimulants, which are the most commonly prescribed drugs for this disorder.

The stimulants are one of the most studied medications we have. They have been in use for over 40 years. Children have grown up on these medicines and have been followed into adulthood by child psychiatrists, pediatricians and family doctors. They have not been associated with any major negative effects.

With adults, there has been concern about that stimulants could adversely affect blood pressure. However, studies have not been able to correlate blood pressure elevations with stimulant use in patients who were not hypertensive to begin with. In addition, adult patients with hypertension requiring management with antihypertensive medication were able to tolerate stimulant treatment of their ADHD without significant elevation in blood pressure. However, stimulant use can be correlated with elevated blood pressure, so I recommend that all my patients aged 18-50 monitor their blood pressure monthly. Adults over 50 should monitor their blood pressure more closely.

A recent Canadian report linked Adderall XR with sudden death. While there were significant flaws in that research, people with existing heart disease or a family history of sudden death should not take stimulant medications.

### Precautions people on stimulants should take:

- Monitor your blood pressure monthly, especially as you age or if you have high blood pressure in your family.
- Tell your doctor about your own and your family's medical history, especially if someone in the family has died of sudden death.
- Tell all doctors about all the medicines and herbs you are taking.
- If you think you might have a heart problem, stop taking stimulants and see your primary health care provider or a cardiologist.
- When you take any stimulant be careful about using other stimulants like pseudoephedrine, *ma huang*, and high amounts of caffeine (coffee, teas, colas).

### Potential for stimulant abuse in drug-users

Another concern with stimulant medication is the potential for abuse. It must be noted, that the incidence of substance abuse is greatly elevated in those with untreated ADHD, so treating the illness is likely to diminish rather than increase the rate of abuse. However, if a patient is an active substance abuser, stimulants are not the best choice of treatments for ADHD. We need to be concerned about diversion of the stimulants, i.e., the drugs being resold. We also must take into account the mentality of substance abusers, which says that if one pill is good, then more is better. And, most obviously, using stimulants to get high is a concern.

Another problem with an active substance abuser is that it is difficult to know whether a given medication for ADHD is having the desired effect because of the presence of other mind-altering drugs.

Past I.V. or skin popping drug abusers also require special care when prescribed stimulants. The physician needs always to evaluate these issues before starting any medication and be vigilant thereafter.

ADHD stimulant medication is taken orally. To produce a "high" stimulant medication needs to reach the brain very quickly. Oral use interferes with that, so abusers will break up

medicines into powders and snort it or dissolve it and then inject. Long-acting preparations make it very difficult or impossible to do that, so these formulations would be preferable when a risk of abuse is present.

### Likelihood of drug abuse is diminished when ADHD is treated

Patients without active or a history of stimulant abuse are not likely to develop drug problems as a result of the prescribed stimulants. Indeed, it is the *untreated* ADHD patient who is at heightened risk for becoming a substance abuser. Most of the long-term research shows that the use of medications that effectively treat ADHD decrease the risk of developing an abuse problem over time.

### Diagnosis is challenging, dosing is, as well

There are serious challenges in diagnosing adult ADHD. As one gets older with untreated ADHD, many comorbid disorders can occur which complicate the diagnosis. Even once diagnosis is made, establishing an optimal stimulant dose is challenging. There are no rules that define doses like weight or height. There is a fine line between the optimal dose at which a patient gets maximum performance with minimal side effects and a dose that is too great,

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## Video Games

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games rewards this so effectively. Fast wave activity in the frontal lobes allows a person to inhibit a response long enough to think about the consequence of the action before acting. It suppresses impulsivity. In video gaming, as with real life fight or flight, success comes with quick responses, not measured, well-thought out plans of action.

There is another condition that manifests with a neuroelectrical signature consisting of overabundance of slow waves and a paucity of fast waves in the prefrontal cortex. It is ADD/ADHD.

### Video Gaming: Neurofeedback Training with Negative Results

Neurofeedback training utilizes the brain's ability to alter its structure and programming (neuronal plasticity). Patients are connected to electrodes that measure neuroelectrical activity in the brain. This activity is displayed to the patient on a video screen and as the patient alters their brain activity in a functional direction, the video image changes to let them know that they have achieved success.

Over time, practicing healthier brain activity works like practicing anything. Patients get better at it, until, eventually, it becomes the most natural thing in the world.

When neurofeedback training is used to correct ADHD, the computer thresholds are set to reward the absence of slow-wave and a corresponding increase fast-wave activity in the frontal cortex. This is the profile of healthy brain activity.

Video gaming produces brain waves that are the opposite of what is desirable for healthy functioning. Looking at it from that perspective, video gaming is actually "neurofeedback therapy" that produces negative results. While neurotherapy patients might spend 60 minutes a week training their brains to

work better, heavy video gamers spend hours and hours every day training their brains to function like someone who suffers with ADHD.

For adolescents without ADHD or without a vulnerability to ADHD, moderate thrilling video gaming may present no serious risk. However, for those with ADHD or with a predisposition to it, extensive thrilling video gaming may be equivalent to an incipient alcoholic being encouraged to play nightly drinking games.

In my practice, I have found that many heavy users of thrilling video games are often socially challenged and lack the maturity for their age, have anxiety/anger issues, are doing poorly in school, are difficult to engage in treatment and some respond poorly to medication. There can be a "chicken and egg" argument made. Perhaps boys with these troubles are drawn to heavy gaming. But it is also possible that the heavy gaming is causing the problems or making them worse.

Parents be warned.

## Stimulants

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making treatment intolerable. The doctor must use feedback from the patient to fine tune dosing. This is one of the major problems with ADHD patients – they have great difficulty in observing themselves. The physician needs to probe and teach the patient what and how to look at themselves. It can take time to reach optimal dosing.

### Drugs are only part of the solution

Even once an adult ADHD patient has been successfully placed on a dosage of stimulants, the disease will not automatically resolve. Medicine will improve symptoms such as attention, focus, concentration, detailing, organization, ability to stick to things with

## Inge E. Wieser Joins Tarnow Center Research Group

Inge E. Wieser has joined the Tarnow Center as Senior Research Coordinator for the Tarnow Center for Self Management.

Ms. Wieser is a licensed Registered Nurse with many years of clinical experience and a Certified Clinical Research Coordinator (CCRC) with more than 13 years of research experience. She is a member of the Association of Clinical Research Professionals (ACRP) since about five years and has managed Phase I, II, III and IV protocols. She has been working mainly in the University of Texas (Houston) system and has coordinated drug studies as well as device studies.

Research done at the Tarnow Center helps guide our clinical decisions about using medications with children, adolescents and adults with psychiatric disorders.

tasks, decrease hyperactivity, fidgeting, hypertalkativeness and impulsivity. It may also improve short-term memory because patients can pay attention better. But all that isn't a cure.

Patients have likely developed many habits that are unproductive and inefficient, like rushing through things and making careless mistakes, or waiting to the last minute to do things and then being in a panic. Medicine doesn't, by itself, change bad habits, but it gives the patient the *power* to change.

Patients must answer the question for themselves whether medicine is worth it, but they should think about it carefully. People with ADHD have a tendency to be stubborn and oppositional. So again, they should carefully consider both the risks of medicine, the potential rewards of medicine and the consequences of doing nothing.

# High School Launching Prep Group

*by Sophia K. Havasy, Ph.D.*

- For:** Adolescents in high school  
(10<sup>th</sup>-12<sup>th</sup> grades)
- Time:** One hour each week  
Tuesdays 6:15-7:15 PM  
from June 13 through July 18  
(off July 4)
- Topics:** Self-awareness  
Strengths & weaknesses  
Motivation  
Goals  
Active processing  
Hidden curriculum  
Skills and accomplishments
- Parents:** Parents meet one hour  
three times,  
Tuesday 5-6 PM on June 13,  
June 27 and July 18.
- Parent  
Topics:** Defining launching goals  
In place vs. under construction  
Risk factors  
Life skills development
- Cost:** \$640 (eight sessions)

# College Launching Group

*by Sophia K. Havasy, Ph.D.*

- For:** Incoming college freshmen  
and college students who have  
already faced significant  
struggles
- Time:** One hour each week  
Thursdays 6:15-7:15 PM  
from June 15 through July 13
- Topics:** Self-awareness  
Strengths & weaknesses  
Stress management  
Time management  
Goals/motivations  
Hidden curriculum  
Expectations
- Parents:** Parents meet one hour  
three times,  
Thursday 5-6 PM on June 15,  
June 29 and July 13.
- Parent  
Topics:** Risk factors  
Expectations  
Plan B
- Cost:** \$640 (eight sessions)

g r o u p s

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**Self-Management<sup>SM</sup> and Relationship Skills for School Age Children**

*Promoting Competence: Self-Management<sup>SM</sup> and Relationship Skills for School Age Children*

**5<sup>th</sup> - 6<sup>th</sup> Grade Girls**

Galleria Office:  
Mondays, 5:00 - 6:00 PM  
FACILITATOR: Diane N. Roche, Ph.D.

**3<sup>rd</sup> - 5<sup>th</sup> Grade Boys**

Galleria Office:  
Mondays, 5:00-6:00 PM  
FACILITATOR: Lourdes Valdes, Ph.D.

**3<sup>rd</sup> - 4<sup>th</sup> Grade Girls**

Galleria Office:  
Mondays, 4:00-5:00 PM  
FACILITATOR: Diane N. Roche, Ph.D.

**Self-Management<sup>SM</sup> and Social Skills for Boys**

*Promoting social competence, self-management<sup>SM</sup>, and behavior management*

**1<sup>st</sup> -2<sup>nd</sup> Grade Boys**

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Mondays, 4:00-5:00 PM  
FACILITATOR: Lourdes Valdes, Ph.D.

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**Process and Self-Management<sup>SM</sup> for Girls**

*Self-management<sup>SM</sup> skills, peer relationships, identity issues, and self- esteem.*

**7<sup>th</sup> - 8<sup>th</sup> Grade Girls**

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FACILITATOR: Diane N. Roche, Ph.D.

**Process and Self-Management<sup>SM</sup> for Boys**

*Improve individual self-management<sup>SM</sup>, explore identity and independence, and set personal goals.*

**6<sup>th</sup> - 8<sup>th</sup> Grade Boys**

Galleria Office:  
Wednesdays, 5:00-6:00 PM  
FACILITATOR: Lourdes Valdes, Ph.D.

**7<sup>th</sup> - 8<sup>th</sup> Grade Boys**

Sugar Land Office:  
Tuesdays, 5:00-6:00 PM  
FACILITATOR: Lourdes Valdes, Ph.D.

*High School*

**Process and Self-Management<sup>SM</sup> for Girls**

*Improve self-esteem, develop peer and family relationship skills and set personal goals.*

**9<sup>th</sup> Grade Girls**

Galleria Office:  
Thursdays, 4:00-5:00 PM  
FACILITATOR: Diane N. Roche, Ph.D.  
Sugar Land Office:

Wednesdays 5:00-6:00 PM  
FACILITATOR: Yael R. Ebenstein, Ph.D.

**10<sup>th</sup> - 12<sup>th</sup> Grade Girls**

Galleria Office:  
Thursdays, 4:00-5:00 PM  
FACILITATOR: Diane N. Roche, Ph.D.

**Process and Self-Management<sup>SM</sup> for Boys**

*Promoting social competence, self-management<sup>SM</sup>, and behavior management*

**High School Boys**

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FACILITATOR: Ron Swatzyna, Ph.D., LCSW

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FACILITATORS:  
Jay D. Tarnow, M.D. and  
Ron Swatzyna, Ph.D., LCSW

*Self-Management<sup>SM</sup> for 15-18 Year-Old Boys*

FACILITATOR: Jay Tarnow, M.D.  
This group is for boys who are in Family Therapy at the Tarnow Center or whose parent(s) are in therapy at the Tarnow Center. The group will start at the beginning of September and will meet between 5pm and 6pm on either Tuesday or Thursday. For further information, please call the Center at 713-621-9515.



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## *Fast ForWord<sup>®</sup> at the Center*

Scientific Learning produces the Fast ForWord family of products, a series of computer-delivered reading intervention products that complement reading instruction. It incorporates findings from more than 30 years of neuroscience, reading, and language research to help children, adolescents, and adults build the cognitive skills critical for improving reading and language abilities. The Fast ForWord products include exercises focusing on memory, attention, processing, and sequencing— all essential skills for reading and learning— and improve phonemic awareness, phonics, fluency, vocabulary and comprehension. Fast ForWord products develop Learning MAPs skills, critically important prerequisites for successful reading. When Learning MAPs are stronger, students are able to benefit from reading instruction.

- **M**emory—hold information and ideas short and long-term: essential for word recognition, comprehension of complex sentences, and remembering instructions.
- **A**ttention – focus on tasks and ignore distractions
- **P**rocessing – see and distinguish images and sounds quickly enough to discriminate their differences; a prerequisite for phonemic awareness and reading.
- **S**equencing – cognitive skill that relies on memory, attention, and processing, and is essential for phonics, word fluency, reading and oral comprehension

The Tarnow Center for Self-Management<sup>SM</sup> will offer Fast ForWord summer programs geared to students who need to quickly build the language and reading skills considered critical for academic success in school.

For more information regarding these programs please call the Tarnow Center Intake Coordinator at 713-621-9515, ext. 227.