

A REVIEW OF THE SCIENTIFIC STUDIES ON THE INTERACTIVE METRONOME® 2001

This is brief report of several substantive scientific studies on the Interactive Metronome® (IM). The summaries are based upon the reference materials cited at the end of each study. Review of these citations for their full research findings is encouraged.

IMPROVING SPECIAL EDUCATION STUDENTS' MOTOR INTEGRATION

This study was the first controlled investigation into the impact IM training has on children. The purpose of the study was to examine the effects of IM training on the timing and motor coordination development of 6 to 12 year old special education students in a midwestern school district. The use of the computer to provide special cognitive and neural training has been a subject of increasing interest. As a computer based adaptation of the traditional metronome, IM training was seen as a potential enhancement to such efforts because of the computer's ability to make rapid time measurements within a highly defined structure and to provide rapid performance feedback.

Design of the Study

A randomized pre-test post-test control group design was employed. Parents of special education students in grades 1 through 5 were invited to participate. From the volunteer pool, fifty parents were selected, giving their permission to include their children in the study. The students were randomly assigned into the treatment group (IM group) and a Control group. The Control group was pre-tested and then returned in eight weeks for post-testing. The IM Group received treatment sessions of about 45 minutes each, once per day over the eight week period and then were post-tested. From the initial 50 participants, a total of 37 students fully completed the study (22 IM group and 15 Control group students). Gain scores for each participant were computed by subtracting pre-test scores from post-test scores on the Bruininks-Oseretsky (BO) and Motor Abilities Tests: Sensory Integration and Praxis Test of Fine Motor Integration (MAT).

Results of the Study

Multivariate Analysis of Variance of the mean gain scores on the BO showed a significant overall difference between the two groups. The IM group exhibited statistically significant differences on two of the BO

subtests in visual motor control and coordination ($p=0.005$). No significant differences were found between the groups on speed, agility, and strength measures and MAT measures. Taken as a whole, the Control group showed a pattern of losses in performance in all subtest categories while the IM group showed a loss in only one sub-test: Running Speed and Agility.

Implications of the Study

The results of the study were encouraging. There were enough gains made in motor coordination and control to recommend further study of the IM. Based upon the results of this pilot study with its limited number of treatment sessions and the relatively small number of students, the results in such a short time period with children that have historically shown slow progress were encouraging.

Reference

From Stemmer, Jr., P.M. (1997). Improving student motor integration by use of an Interactive Metronome®. Paper presented at the annual meeting of the American Educational Research Association, March 24, 1997 at Chicago IL. Paul Stemmer, Jr., is Director of the Center for Research at Madonna University, 36600 Schoolcraft Road, Livonia, Michigan 48150.

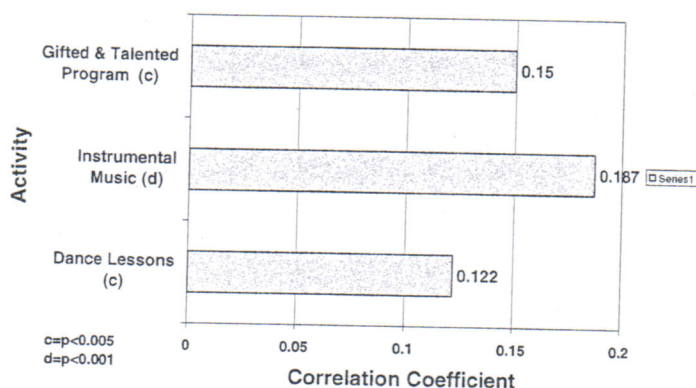
ASSESSMENT OF IM VALIDITY AND RELIABILITY: CORRELATIONS BETWEEN IM PERFORMANCE, AGE AND ACADEMIC ACHIEVEMENT

A purpose of this study was to assess the internal characteristics, reliability and concurrent validity of the IM® as a measure of motor performance. Of particular interest were the relationships that the IM had with age and measures of school achievement.

The study investigated the timing of 585 four to eleven year olds in Effingham, Illinois. The children completed seven movements by keeping pace with the metronome beep. The movements included: patting knees with both hands, clapping hands together, patting knees with alternating hands, patting knee with preferred hand, patting knee with non-preferred hand, and toe tapping the floor pad with alternating feet. Children received a millisecond score for each activity generated by either a hand trigger or footpad trigger on each of the seven activities, each score representing the average timing for each activity.

Special Activities. Figure 4 reveals statistically significant correlations for children involvements in three special activities: being part of a gifted & talented program, having been involved in instrumental music, and having taken dancing lessons. Students performing

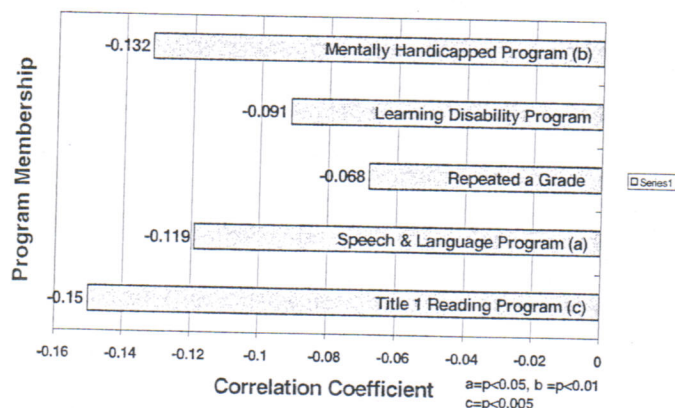
Figure 4 - Correlation of IM Performance with Special Activities



better on the IM tasks also were more likely to have participated in a gifted & talented program, and/or to have taken instrumental or dance lessons.

Participation in Compensatory Programs. Figure 5 shows statistically significant correlations for participants in three compensatory programs: mentally handicapped, speech & language and Title 1 reading programs. The significant negative correlations suggest students in these programs perform poorer on the IM tasks than students not in the programs.

Figure 5 - Correlation of IM Performance with Participation in Compensatory Programs



Implications of the Study

The study results found the IM to show strong evidence of both reliability and validity as a means of assessing children's motor timing and planning capacity. The fact that IM performance correlated significantly with the several variables presented above does not guarantee that improved timing leads to improvement in these abilities; however, it is highly plausible that it does. Children's motor planning and timing is important because it is a key factor in sports, music, and dance, in speech and general life functioning. On-going studies have detected strong signs of a relationship between improvements in children's timing and improvement in their reading. If IM research currently underway confirms such a relationship, the IM will add one more tool to achieve a national goal of having all young children complete third grade with the ability to read.

The correlations in this study support the IM as a measure of motor planning and sequencing. The correlations between the IM and age and academic achievement together with the intervention studies (see study below and Stemmer's study earlier) support the use of the IM as an important contributor to basic capacities that underlie a number of important skills.

Reference

Kuhlman, K. & Schweinhart, L.J. (1999). Timing in child development. Ypsilanti, MI: High/Scope Educational Research Foundation. (In press).
www.highscope.org/movement/Timing%20paper/jrme.htm

EFFECT OF INTERACTIVE METRONOME™ TRAINING ON CHILDREN WITH ADHD

In this study, boys with ADHD, who received the IM intervention, were compared with a control group receiving no intervention, and a second control group receiving a placebo computer based intervention. The IM intervention group showed statistically significant improvements over both control groups in areas of attention, motor control, language processing, and reading, and in their ability to regulate aggression. This study was published in the American Journal of Occupational Therapy (AJOT) in March 2001. Also, an article on the clinical applications of the IM appeared in the same AJOT volume.

SUMMARY OF THE MAJOR RESULTS OF THE INTERACTIVE METRONOME® STUDIES

The above studies support the following conclusions about the IM. The Interactive Metronome®:

1. Improves visual motor control and aspects of motor planning and coordination and in both special education students and ADHD boys.
2. Improves adult focus, concentration and the ability to coordinate intention with the execution of some complex motor activities such as golf.
3. Positively correlates with measures of motor coordination and attention to task.
4. Positively correlates with children who have been involved in rhythmic activities such as music and dancing.
5. Positively correlates with measures of academic performance such as mathematics, language, reading and achievement.
6. Differentiates between students in compensatory education programs and those not in such programs.
7. Shows strong evidence of reliability and validity as a measure of motor planning and motor planning capacity.
8. Shows statistically significant improvements in boys with ADHD in their attention, language processing, reading, and the regulation of aggression.

Overall, the IM training shows very encouraging scientific evidence of helping individuals to improve their ability to focus on tasks, timing, coordination, rhythmicity, and their planning and sequencing capacities.

MORE INFORMATION ABOUT THE INTERACTIVE METRONOME® CAN BE FOUND AT:

www.interactivemetronome.com or by calling:

toll free (877) 994-6776.

Measuring and Validating Sensory and Motor Progress

Case reports on the Interactive Metronome

New and appealing technologies promise to improve an array of skill areas for occupational therapy clients. As an OT seeking to make the best use of new technologies, I believe it is imperative to measure and correlate with data any reported qualitative and functional gains. The Interactive Metronome is a technology that has demonstrated qualitative improvements in such areas as motor planning, modulation of movement, attention and smooth coordinated actions—while at the same time providing real-time quantitative data to help validate progress.

How it Works

The Interactive Metronome (IM) is a PC-based interactive version of the traditional music metronome. Hand and foot sensors are used to objectively measure a user's performance as he attempts to move with different motor patterns to a fixed metronome beat audible through stereo headphones.

The inability to perform on the beat is measured and the data recorded is in milliseconds, with a possible range of 0 to 500 milliseconds (ms). The lower the score, the less the user's average error and the better his performance. Thirteen different patterns address motor planning skills, providing a way to exercise a number of underlying central nervous system processes. In training mode, a patented auditory guidance system—like training wheels on a bicycle—progressively challenges users to improve motor planning, sequencing and timing, which are involved in sensory-motor regulation and the ability to focus and attend.

Case Reports

Daniel is a 13-year-old boy with learning disabilities who has attended 45-minute occupational therapy sessions twice a week for the past year. Recently, Daniel was diagnosed with stress fractures in his lumbar spine. I knew that Daniel utilized unusual strategies to carry out some motor tasks, however, he presented with basic functional skills within his daily routines. I felt confident that Daniel's treatment plan was

meeting his sensory and motor needs. However, during the IM long test, which is a standardized test battery administered pre- and post-IM training (but can be used independently as well), major deficits in his motor planning skills were quantitatively and qualitatively evident.

Daniel exhibited significant difficulty coordinating specific movements with the beat of the IM. During the first session, he

As a result of the IM sessions, Daniel was able to perform coordinated movements in a more relaxed manner.

had the opportunity to practice these tasks. He reversed the direction of some movements, displayed compensatory shoulder elevation, and eventually became entirely dystonic and emotionally overwhelmed.

When I assisted in a hand-over-hand approach, he had extreme tightness throughout his trunk and upper extremities. I was amazed that he was able to move at all in this severely tight manner. Daniel related that this was typical of his normal movement, which could be a contributor to the stress fractures in his lumbar spine.

As a result of the IM sessions, Daniel was able to perform coordinated movements in a more relaxed manner. His motor planning rapidly improved in a quantitative manner (IM score) as well. Daniel's pre-test score on the IM short form, a two-minute condensed test battery of the IM long form, was 327.47 ms, and his post-IM short form score was 17.76 ms. What an amazing difference! For Daniel, the IM served an important role in the assessment process and therapeutically addressed his deficits.

Steven is a 9-year-old boy who enrolled in the IM program to help improve athletic skills. Steven presented with mild-moderate hypotonia resulting in 'fixing' of his upper extremities with little dissociation of

the upper extremities. Before performing IM activities, Steven often walked and sat in a slumped manner, requiring regular cueing to assume an upright posture. His initial IM short-form score was 329.17 ms and post-IM short-form score was 18.63 ms. After the IM sessions, Steven's mother and I sat down to discuss differences in his ability to perform goal-directed activities. She reported that his hockey skills had drastically improved. For example, in a recent hockey game, he had scored six goals. He also scored one goal in advanced league play. She said that during family golf outings before the IM program, Steven would make contact with the ball about 50 percent of the time. Without any further practice or lessons and after completion of the IM program, Steven achieved better golf scores than his mother.

John is a 7-year-old boy diagnosed with attention-deficit disorder. He had difficulty with modulation of force while performing physical tasks. His mother reported that he often slammed cabinets without realizing the intensity he used while opening and closing them. This was evident during IM tasks, during which he had difficulty with modulation in relation to how fast or slow his hands had to contact the IM hand sensor to remain within a timely range.

John was constantly moving from extremely slow to extremely fast without successfully achieving a steady beat in the middle range. His initial IM short-form score was 246.87 ms and post-IM short-form score was 24.47 ms.

During the early sessions, he often complained of fatigue and at times shed tears of frustration. But John learned how to modulate his movement, and as a result, his IM scores began to steadily fall within a more acceptable range. As he learned to modulate his own intensity during performance, he actually began to enjoy the IM program. Reports of fatigue and episodes of frustration subsided. IM scoring improved, and his mother observed an increase in control of force while performing activities at home.

Recently, his mother reported that he was consistently participating in team

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RHYTHMIC Motor Control

APPLICATIONS OF IM THERAPY IN AREAS OF SPEECH AND LANGUAGE

IMPROVING THE ABILITY TO PLAN AND sequence motor actions can favorably influence Important learning, cognitive and social skills, according to researchers who presented their study findings at the Progress in Motor Control II Conference last month at Penn State University. The researchers also observed the important relationship between attention and aspects of motor regulation, including inhibition, speed, rhythm and coordination.

The study investigated the effect of a new PC-based interactive version of the traditional music metronome concept that has been effectively used as a temporal teaching tool for many centuries. A total of 56 boys, ages 6-12.5, who were pre-diagnosed as having attention deficit disorder (ADD) /attention deficit hyperactivity disorder (ADHD), participated in the study. They were pretested with a battery of well-known tests to assess attention and concentration, clinical functioning, sensory and motor functioning, and academic and cognitive skills. They were then assigned to one of three matched groups.

Nineteen children underwent 15 hours of motor skill timing exercises on the Interactive Metronome® (IM) and then were compared with a control group that received no intervention and a second group that received an equal amount of adult attention while doing exercises on selected computer video games. Both the IM and video groups experienced improvements over the control group with no activity. The IM group experienced significant improvements over the video group in 11 factors (p values ranging from 0.020 to 0.000) on improving their performance in areas of attention, motor control, language processing, reading, and the regulation of aggressive behavior.

The results supported the study hypothesis that IM therapy is an effective intervention for male children with ADHD difficulties. Prior studies have shown that it may be helpful for a variety of processing and sequencing problems. A study by High/Scope Foundation examined 585 children in Effingham, IL, and revealed that a six-minute test utilizing the IM-involving planning, timing and rhythmicity of motor regulation—correlated with the developmental, learning and attentional problems; improvements in academic performance; and age-expected performance changes during their elementary school years (Kuhlman, Schweinhart, 1999).

In a Kentwood (MI) School District study, children in special education classes with a range of developmental and learning problems trained on the IM. They demonstrated gains in motor performance in comparison to a similar group without such therapy (Stemmer, 1996). Another recent study by Central Michigan University has shown that IM therapy can improve motor control, focus and athletic performance in aspiring golfers (Libkuman, Otari, 1999).

The findings confirm what occupational and physical therapists, speech pathologists, educators and mental health professionals have intuitively known for years: motor planning and sequencing play a central role in human development. A number of noted scientists also have noted recently this important relationship among motor skills, concentration and cognitive abilities and have endeavored to understand and explain it.

According to Stanley I. Greenspan, a psychiatrist and clinical professor of psychiatry and pediatrics at the George Washington University Medical School, this ability to plan and sequence actions first emerges as the 6- to 12-month-old infant reaches for and explores objects and exchanges reciprocal affect cues and gestures with care-givers. It is essential for adaptive motor development and language development. It is also essential for complex social behavior involving a number of sequential steps, such as sharing toys, complex greeting patterns, or simply playing with others.

In a series of publications, including his new book, *Building Healthy Minds* (Boston: Perseus Books, 1999), Greenspan shows how sequencing motor actions and behaviors is a vital part of the six essential building blocks of intelligence and emotional health: attention, engagement, purposeful actions, complex problem-solving interaction, creating ideas, and logical, abstract thinking. The ability to sequence actions allows the growing infant and child to develop ideas and concepts and ultimately become purposeful and functional in his or her world.

Interestingly, according to child neurologist Roberto Tuchman, director of the Miami Children's Hospital Dan Marino Center, brain imagery studies indicate there is increased activity in the frontal and prefrontal cortex during early development as an infant is learning to be purposeful and se-



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DO YOU HAVE THE RIGHT BEAT? IT'S ALL IN THE TIMING.

The Interactive Metronome "IM" – A new Addition to Comprehensive Treatment Planning

Is your child having difficulty performing motor activities, concentrating on school lessons and attending to directions, socializing, or solving problems?

A growing number of practitioners around the world are pioneering the use of a new software program with children and adults, with a wide variety of challenges. Barrie G. Galvin, OTR/L and Associates LTD. is pleased to announce the **first site in Northeast Ohio** to offer comprehensive planning including the use of the **Interactive Metronome (IM)** for children, beginning at age 5, and adults.

Interactive Metronome (IM), a neural training method, has been shown to significantly improve the capacity to acquire the organizational building blocks necessary to concentrate on a lesson, move with coordination and attend to a task. According to Stanley I. Greenspan, M.D., noted child psychiatrist and one of the study's authors, "Attention, learning and problem solving depend on the ability to plan and sequence actions and ideas. The IM helps children improve basic motor planning and sequencing capacities."

Thinking, concentrating, learning and successfully interacting with others are important skills for success. Many experts in child development believe that achievement in these areas is strongly influenced by how well a child develops the ability to motor plan and sequence tasks. Everything the human brain does requires exact timing and rhythmicity. The child who has difficulty with organizing, timing and sequencing motor tasks may also have difficulty concentrating on a lesson, following directions and solving problems. These difficulties will hinder a child's ability to read, write or perform math skills. Initial published studies have shown significant promise:

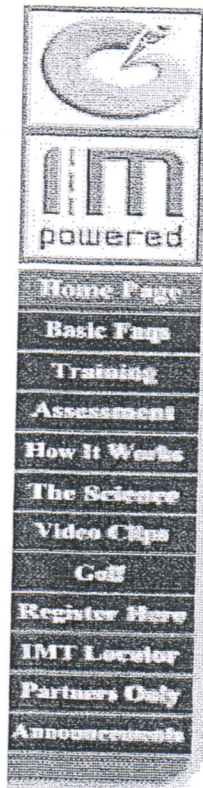
Following a clinical study of children with ADHD, improved performance was noted in areas of attention, motor control, language processing, reading and regulation of aggressive behavior. (*Published in the March/April 2001 issue of The American Journal of Occupational Therapy*). Additional studies document functional improvement in children with motor planning and sequencing difficulties, cerebral palsy, language and speech problems, various learning disabilities, and social and communicative difficulties. A recent study also showed that **IM** therapy improves motor control, focus and athletic performance in aspiring golfers.

The Interactive Metronome involves combining the principles of a traditional music metronome with the precision of a computer using headphones, along with hand and foot sensors, to coordinate movement with a rhythmic tone. The standard program involves initial testing, a minimum of 35,000 repetitions and achievement of goals reaching a documented accuracy millisecond level. Children not ready to perform the standard protocol begin with an individually designed in-clinic and home program. The patented auditory guidance system progressively challenges participants to improve their motor planning, sequencing and rhythmic timing performance.

James F. Cassily, Director of the Neural Technology Research Center in Grand Rapids, Mich., is the inventor of the Interactive Metronome. Interactive Metronome, Inc., is based in Weston, Fla., with its national research and support center in Grand Rapids, Mich. The company offers its patented Interactive Metronome training only through a growing network of clinical therapists, child psychologists and educational specialists throughout the United States. See www.interactivemetronome.com or call (954) 385-4660.

For more information or an appointment with a trained neural timing (NT) therapist, please contact Barrie G. Galvin, OTR/L and Associates, LTD. at 216-514-1600.

For Children of all Abilities and Their Families



Interactive Metronome

In-Boosting the abilities of Dr. Greenspan

What's New Families Practitioners Contact

Message of hope to parents of children with learning problems

From Dr. Stanley I. Greenspan, M.D. Clinical Professor of Psychiatry, Behavioral Sciences, and Pediatrics at George Washington University Medical School, a practicing child psychiatrist, and Chairman of the Interdisciplinary Council on Developmental and Learning Disorders.

Dear Parent:

One of the most significant underlying processing capacities with which we have been working is motor planning and sequencing. The capacity to plan and sequence actions or thoughts relates directly to a child's ability to attend, follow directions, carry out and plan actions, and solve problems, as well as read, write, do math, and most importantly, think.

Until recently, we have only been able to approach children's planning and sequencing capacities through surface behaviors in remedial education programs, which involve practicing such basics as writing or following directions. Now, however, we believe there is a new method of enabling a child to directly improve his underlying processing abilities for motor planning and sequencing and, therefore, strengthen many of his most fundamental learning capacities.

Three years ago I was invited to become a member of the Interactive Metronome Scientific Advisory Board, and accepted the position of Director of Research. James Cassily and many others have spent years developing, researching and documenting this new approach to addressing underlying neural capacities, rather than just treating symptoms. The soon to be published results of several of the recent IM studies I have overseen strongly indicate that there is new hope on the horizon for concerned parents, health care providers and educators.

One such double blind study examined the effect of the IM on children diagnosed as having Attention Deficit Hyperactivity Disorder. Most of the IM children in that study evidenced significant positive gains in their capacity to focus and attend; plan, sequence, and coordinate actions; as well as a variety of cognitive and language skills, including reading, spelling, and math. Importantly, each child's gains also were unique in relationship to his abilities and/or challenges.

Many of the children in the above study had been put on Ritalin shortly after they were diagnosed with ADD. They all were easily distractible children. They had problems with the ability to plan and sequence actions, for example, following directions at school or remembering where things are. And as adults they are the kind of people you don't want to have as your assistant. They can never remember where anything is or what to do, they don't follow through well and they have trouble with different careers.

IM Training improves a child's basic sequencing ability through a series of exercises. For a lot of kids this means they may not need to take as much medication, and some will not need to take it at all. Most importantly, because of IM Training, these children were no longer destined to return to their highly distractible state as soon as they quit taking medication on a regular basis!

A number of parents have asked about what type of experiences at home can enhance what their child gained from their IM Training program. While many of the traditional approaches to learning are helpful, a frequently overlooked, very helpful experience is to have long conversations with one's child about a variety of topics, from favorite music and TV shows to friends, school, etc.

High-tech ticker helps user keep beat

Inventor's unique Interactive Metronome helps patients with ADD and other problems focus on what they're trying to do

By CHRIS MEEHAN

The Grand Rapids Press

James Cassily left the world of rock 'n' roll because the beat had gone bad.

He loved producing records with the likes of Bob Seger and Teegarden and Van Winkle, and mixed sound for Janis Joplin and the rock band 'Toko. But the heavy metal groups and disco acts of the late 1970s left him flat.

So the Detroit-born son of a Teamster's Union organizer decided to take his electrical engineering talents elsewhere. He plugged into the cable and satellite TV business.

But the Grand Rapids resident wasn't happy. In 1989, Cassily began working with the beat again. It was different this time.

Instead of mixing sound for hit records he started tinkering with a music-based technology that a decade later promises to revolutionize treatment of such conditions as Attention Deficit Hyperactive Disorder, autism and cerebral palsy.

It's called an Interactive Metronome — a high-tech version of the constantly ticking tool that helps musicians improve their timing.

Cassily's patented computer-based therapy is being formally unveiled this week in his Grand Rapids clinic after years of development.

"This thing works I'm sure of it," said Cassily, 55, after running patients through their paces at the Cassily Clinic on East Beltline Avenue near Burton Street SE.

"I'm talking about tapping into the brain's time clock with this," he added. "Everything is a matter of timing."

He has drawn the financial backing of a top former Amway Corp. executive and the support of doctors, psychologists, therapists and parents. They all agree: This wild-haired, fast-talk-

ing man from West Michigan is on to something.

"I think this is going to be a helpful tool for therapists all over the country as they work with people, especially children, who have a hard time getting on task," said Jeanetta Burpee, director of an occupational therapy clinic near Philadelphia.

"The metronome helps put the body on automatic while allowing the mind freedom to think, focus and then act," said Burpee, whose clinic is independently researching the technology.

Simply put, trainees use a combination of head phones and hand and foot sensors to coordinate movements to electronic beats generated by a computer.

A stack of studies have been submitted to a variety of scientific publications submitted to the American Journal of Occupational Therapy.

ADHD is typified by restlessness and the inability to focus attention. The study developed by independent psychologists — found significant improvement in the boys' abilities. It is the professional recognition Cassily has been waiting for.

"We've been working on this thing for 10 years," said Cassily, who moved to West Michigan in 1989.

"I've always had a knack for electronics," he said, sitting in an office decorated with photos of him with rock stars whose records he produced. "But I never thought I'd come up something like this."

Tears of joy as boy walks

Thomas Eggleston was working as chief operating officer of Amway Corp. when he met Cassily. Eggleston brought his son, Jimmy, to Cassily for training on the Interactive Met-

ronome to help him learn the piano. But the young boy had more difficult challenges than fingering out "Chopsticks." He was born without one leg and had other disabilities.

"Meeting and working with Jim was life-changing for our family," said Eggleston now executive vice president for e-commerce for Florida-based Auto Nation, a national firm that sells used cars.

This was in 1994, just as Cassily was perfecting the Interactive Metronome. At that time, he had only glimpsed its applications.

One thing led to another with Jimmy. After several 50-minute training sessions, Cassily took the therapy to another level. He created a remote-control headset to help the boy walk on a new prosthetic leg.

The child took a few faltering steps in the basement, leaning on a walker. But the beat pumping through earphones made a difference. Soon, he was outside kicking a soccer ball.

"Once Jimmy got aligned to the beat, he was able to walk on his own," said Eggleston, now an investor in the business. "We all started crying."

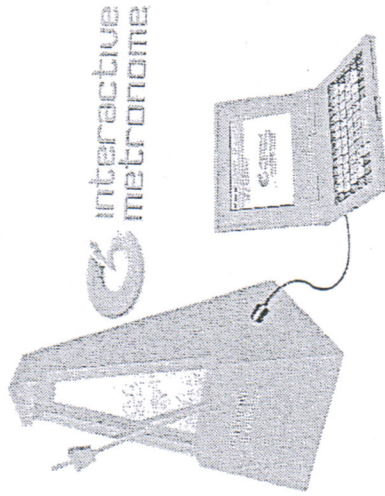
Cassily proceeded slowly. He wanted to test different situations, hoping to compile studies to convince the scientific community.

Staying focused in school

In 1996, he and his trainers used the treatment on more than 40 special-education students in Kentwood Public Schools.

The goal: To see if they could focus their attention better on school work after several hours of the therapy.

"All of the students improved in their ability to respond and follow directions some of



them very significantly," said Lois Shepard, Kentwood's assistant superintendent for curriculum and instruction.

A 1998 study of 585 children by the Effingham, Ill., school district also showed a correlation with performance on the Interactive Metronome and how well the children did in school. This was a way of showing the metronome can be used to help diagnose learning disabilities.

"This is one of the most innovative and surprising matters I've ever worked on," said Fred Burkhardt, the Grand Rapids lawyer who helped Cassily obtain patents from the U.S. Patent Office.

Burkhardt, a patent attorney for more than 20 years, has a personal reason for his support. His son, Eric, went through the training about two years ago.

Battling ADHD, Eric had a terrible time with his classes at Breton Downs Elementary School in East Grand Rapids.

(continued)

But after slipping on the earphones and learning to synchronize his hands, something subtle happened in his brain. His ability to focus grew, his attitude improved and his IQ actually went up 20 points, his father said.

"It's hard to say exactly if it was the metronome, but my son is a much more serious and cooperative student," Burkhardt said.

The study submitted to the American Journal of Occupational Therapy involved 56 boys diagnosed with ADHD. They were split into three groups: one that received no treatment; one that played non-violent video games, and a third group that got 15 hours on the metronome.

Those who had no treatment did not improve, those on the video games showed some signs of better focus and attention, and the third group showed significant improvement, said Robert Shaffer, a Grand Rapids psychologist and assistant professor of pediatrics at Michigan State University's College of Human Medicine.

"This study is only the start. But it seems to show the metronome may prove to be an entirely new approach to treating the problem of ADHD," said Shaffer, who helped develop the study and was lead author of the research paper.

'I can pay better attention.'

Lavonne Tuinstra's son, Jeremy, was part of the study.

"It was unbelievable what has happened to him," she said. "His grades have gone up in school. He can look people in the eye. I'm not sure how it works, but it does."

Jeremy, 12, a fifth-grader at Calvin Christian Elementary, has been able to go off the Ritalin he had been taking to control attention problems, said his mother.

Her other son, Ryan, has gone through the treatment as well.

"I like it," said Ryan, also 12. "It helps me to shoot a basketball straighter. And I can pay attention better."

Both Jeremy and Ryan were at the Cassily Clinic one recent afternoon. Technicians worked with them in small rooms containing the computerized metronome, headsets, foot pads and hand buttons.

Into their ears were piped sounds — each thump sounding like the beat from an agogo, a type of bongo. They were scored by a technician on how far & ahead or behind the beat they were.

The theory is this technology exercises a part of the central nervous system that deals with motor planning and sequencing, said Dr. Stanley Greenspan, the Director of the Interactive Metronome Scientific Research Board and a former program director at the National Institute of Mental Health.

"Jim Cassily has come up with a therapy that offers us a new and useful window into the way the nervous system works," said Greenspan, now a Clinical Professor of Psychiatry and Pediatrics at George Washington University and one of the authors of the ADHD study.

Currently, more than 50 clinics have purchased the software and are using the metronome with their patients. Aside from those with ADHD, they include patients cerebral palsy, Down syndrome and brain injury.

Some clinics are working with people who have Parkinson's disease as well as various hearing and speech problems.

Rhythm in the brain

Cassily was walking excitedly back and forth across his office one recent morning,

talking a mile a minute and dreaming big dreams.

He spoke about the 8-year-old with whom he had worked many years ago, before the computerized metronome. This boy was a friend of Cassily's son, Josh.

Cassily would take the kid's hands, and make sounds with his own mouth whenever the kid was off beat, and the sounds helped the boy learn to be more accurate.

He was trying out his idea that there is a rhythm in the brain that can be touched and trained through sound "That kid is now going to graduate from Michigan Tech at the top of his class. But back then he was really distracted. He just couldn't keep up," Cassily recalled.

As the studies start to come out and more clinics begin to use the metronome, Cassily maintains a grateful attitude. What started with rock 'n' roll has moved into a therapy to heal minds. It also may earn him and his investors a fair amount of money.

"This is the most important thing I've ever worked on," he said. "I could have blown it and just stuck it on the shelf. But that didn't happen."