

3-2009

Human Performance Lab Newsletter, March 2009

St. Cloud State University

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Recommended Citation

St. Cloud State University, "Human Performance Lab Newsletter, March 2009" (2009). *Human Performance Lab Newsletter*. 24.
https://repository.stcloudstate.edu/hpl_newsltr/24

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Human Performance Lab News & Views

Department of Health, Physical Education, Recreation and Sport Science

MARCH 2009

KELLY'S CORNER

~David Bacharach

Hello to everyone from the HPL. As with most things in life, they are finite and quite short on a relative scale. I was reading something somewhere (Sorry, I can't remember...I too am getting older) and it made me reflect on life from a more philosophical perspective than we typically take during our dutiful daily routines.

The story was about a young family faced with putting their beloved dog down. Their dog was 12 and the dog was this couple's first "child" not unlike many couples after which they have real children some years later. The couple was nervous about how their 6 year old son would respond to the death of his playmate. The couple asked their son if he would like to come to the pet hospital where they would say goodbye for the last time. To their surprise, he calmly said yes. They were even more surprised when they watched him gently petting the old dog for the last time as the vet helped the dog slip peacefully away. The couple then sat with their son expressing their sadness that most pets live very short lives compared to humans. It was then the parents learned an unexpected lesson. Their son looked at them and said he knew why pets don't live as long as humans. His words went something like this, "When people are born they have to learn how to live a good life -- like loving everybody all the time and being nice, right?, Well, dogs already know how to do that, so they don't have to stay as long."

That got me to thinking about what a dog might be able to teach us by example. These ideas came to mind: stretch before rising; play every day; delight in the simple joy of a walk; take naps; relish the feeling of fresh air and the wind in your face; on hot days, drink lots of water and lie in the shade; when you're happy, dance around and wag your entire body; when you see someone you love, run to greet them; never pretend to be something you're not; give signals to people around you when you're unhappy long before you bite; let people touch you; and when someone is having a bad day, be silent, sit close, and nuzzle them gently.

By and large, we are social creatures. We are also creatures with pretty simple needs. So as always and perhaps now with a dog's lead, let's try to live the best we can, take care of ourselves and be thankful for everything that we can do in our lives.□

VISITOR FROM ABROAD

~Mary Udermann

In the fall/winter of 2008-9 we were honored to have a visitor from abroad. Dr. Zheng Xiaohong is from Beijing, China and came to the HPL to help with classes and learn more about his field. Dr. Zheng is a scientific coach for China's National Rowing Team where he designs and monitors training programs for the athletes. He earned his Master's and Doctoral degrees in sports training science from Beijing Sports University. I had the privilege to sit down with Dr. Zheng and ask him questions about his training and work with athletes on a national level.

Q: In what type of facility do you work?

A: I work in a lab which monitors athletes during their training for multiple sports. In the lab we perform treadmill testing, lactate testing, bike testing, biochemical testing, and ECG. In the mornings we monitor every athlete's heart rate and blood pressure to observe energy expenditure throughout the day. We also do psychology testing on our athletes. Most of the testing procedures done in the labs in China are very similar to those performed at SCSU in the HPL.

Q: What has been the biggest change you've experienced in America?

A: The biggest change is the classroom teaching style. There is much more classroom discussion, which is good. This keeps the students more involved. When I go back to China I will incorporate this into my curriculum.

Q: Where has exercise science taken you throughout your career?

A: I have been to Germany, Switzerland, Spain, Poland and India learning about different training methods for my athletes. Since being in America, I have been to New York City, Boston, Philadelphia, Washington, D.C., and my favorite which was Niagara Falls.

Q: What do you like best about America?

A: I like the fresh and clean air. I have been very happy in America. There just isn't enough time to get immersed into the culture. I am only here from October 21st to February 19th.

Q: Why did you want to come to America and SCSU in particular?

A: I was interested in sports science and looking to increase my knowledge. In America they have many advances in some areas of the field. The reason I chose to come to SCSU was because of Dr. Bacharach and the HPL website. The website reminded me a lot of the procedures that I perform back home on my athletes.

Q: What has your diet been like since coming to America?

A: I have been cooking mostly on my own. I do like American food, especially beef stroganoff, which I was able to experience at Dr. Bacharach's house during the HPL holiday party.□



NEW FACES IN THE LAB

Mary Udermann is a first year graduate student pursuing a master's degree in Cardiac Rehab. Last spring, Mary graduated from The College of St. Scholastica in Duluth, MN with a B.A. in Exercise Physiology. While there, she was actively involved with the student's chapter of exercise physiology. Mary recently completed an internship in cardiac rehab at North Memorial Hospital and decided that was where her interests lie. Mary is originally from the Foley area and is excited to be back in Central MN surrounded by family and friends. She enjoys going for outdoor runs, bike rides, fishing, camping, playing tennis, and hanging out with friends.

April Kuschke graduated in May 2008 from the University of Minnesota-Duluth with a Bachelor of Science degree in Exercise Science. In Duluth she was very involved in fitness, working as both a personal trainer and group fitness instructor. She loves being in the company of good people who make an effort to live a healthy and happy lifestyle. She wants to incorporate fitness into her career and helping the people within cardiac rehabilitation fit these criteria, making it the reason April is with us this year pursuing a Special Studies: Cardiac Rehabilitation M.S. In her spare time she likes to run, bike, swim, and go out to eat at Olive Garden for ravioli.

Ashlee Ford is a first year grad student seeking a M.S. in Exercise Physiology. She completed her undergraduate work at SCSU in May 2008 with a degree in Biomedical Science. A St. Cloud native, she attended Tech High School where her addiction to gymnastics was rehab worthy. She could never quite kick the habit and thus continues getting her fix by coaching at Tech and judging for the Minnesota State High School League. After graduation she hopes to further her education by tackling medical school and specializing in sports medicine. Ashlee is legally considered a chocoholic and is working on saving money to purchase a Segway. She also enjoys a variety of tunes, TV marathons and all things awesome.

Janna Castellano is from Blaine, MN and is a 2007 graduate of Gustavus Adolphus College with degrees in Exercise Science and Psychology. Upon graduating Janna worked as a personal trainer at Lifetime Fitness. After only one year in the real world, she decided she wanted to learn more about the field of exercise and health. As a result, she is currently pursuing a M.S. in Exercise Science and is interested in earning a Ph.D. in the future. Janna would love to share all her knowledge about health and fitness in hopes to positively influence the lives of others. She plans to go about this through teaching and coaching pole vault at the collegiate level. Janna loves an intense anaerobic workout, especially Kettlebells!



Front: Ashlee Ford; Back (L to R): Janna Castellano, April Kuschke, Mary Udermann

Contemplating Life?
"The clock of life is wound but once, and no one can tell just when the hands will stop ... Now is the only time we own. Live, love, toil with a will. Place little faith in time. For the clock may soon cease to chime."
-Anonymous

2nd YEARS—WHAT THEY'RE UP TO



Sam Johnson spent last summer helping the HPL perform research projects while also preparing for his thesis. He is currently a volunteer coach for the SCSU track and field team and has titled his thesis “Effect of Weight Distribution on Starting Block Performance in Sprinters.” His goal is to determine if varying the load on the arms while in the “set” position affects performance and if there are any variables that may explain different performance levels of the sprint start. Sam hopes to land an internship with an elite level training facility this summer to complete requirements for the Master of Science degree in Exercise Science and plans on entering a Ph.D. program this coming fall.

Mindy Hansen spent the summer preparing for her thesis on volleyball players. She is looking at outside hitters, their maximum jump heights, average jump heights during competition and seeing what correlation there is between the percent differences in those jump heights throughout a match. When Mindy graduates in May, she will pursue a Ph.D. in the area of bioenergetics. She would love to integrate academics and research into teaching and training athletes at a higher level. This spring/summer Mindy hopes to submit an article for publication that summarizes the current literature on high intensity interval training and the effects on the endocrine system.

Cristina Nistler is in her 3rd year at SCSU. She plans to graduate in May with both a B.S. in Athletic Training and M.S. in Special Studies: Sports Training. As her final project, Cristina has written a review of literature on elbow injuries in baseball pitchers. She is currently applying to work as a trainer with minor league baseball teams after graduation.



2008 NATIONAL ACSM PRESENTATIONS

Ana Cristina Bellard Freire and Glenn Street. *Knee Alignment, Peak Forces and Knee Valgus Torques When Landing in Two Different Ballet Positions.*

Andrew Gray, David Bacharach FACSM, Glenn Street. *Minimum Vacuum Level Required to Maintain Limb Volume in Trans-tibial Amputees during Ambulation.*

David Bacharach FACSM, Maria Schilling and Megan Bacharach. *Norms for Aerobic and Anaerobic Capacity in CUSSA Junior Alpine Skiers.*

John T. Schapman, Andrew Bjorklund, Rita Moravec. *Metabolic Work Using a Seated-Elliptical and a Recumbent Ergometer.*

John G. Seifert and Thomas Ebnet. *The Healing Effects of Polymeric Dressings on Road Rash Abrasions in a Racing Cyclist.*

IS STRETCHING BEFORE EXERCISE REALLY BENEFICIAL? ~ Ashlee Ford

Stretching is commonly done prior to exercise, but what many people don't know is that stretching may actually be doing more harm than good. While stretching has been a standard way to “warm-up” by increasing blood flow to the muscles, it now has the capability to decrease performance, especially in power athletes.

Muscle fibers are elongated during passive stretching causing a decrease in their elasticity; these changes can affect contractile properties. The more a muscle fiber is stretched, the less force it can produce during the contraction. Therefore more muscle fibers must be recruited to produce the desired force. More fiber recruitment equals a higher metabolic cost for the activity, causing the economy (the efficiency of bodily movement) to decrease. This means more oxygen will be required to perform the same activity when stretching is done beforehand.

Active stretching, or simply mimicking the range of motion (ROM) necessary for the activity will provide the same “warm-up” effects as static stretching, without the possible decline in performance. This concept can also be referred to as a “dynamic warm-up”. Many athletes and coaches are now implementing this type of warm-up in daily practices where athletes ease into their desired activity by walking or jogging prior to running, or simply emulating positions that allow the muscles to experience the necessary ROM.

Stretching is still of value and shouldn't be ruled out completely. Flexibility is essential for many sports and can be most beneficial at the end of exercise when blood flow to the muscles is high and performance is no longer of concern. Stretching as part of a “cool down” therefore allows the flexibility benefits many athletes desire without harming their performance.□



FROM THE DRAWING BOARD TO THE TRACK ~Sam Johnson

The following is an overview of how a project I began in the advanced biomechanics class last spring evolved into a main component of my thesis.

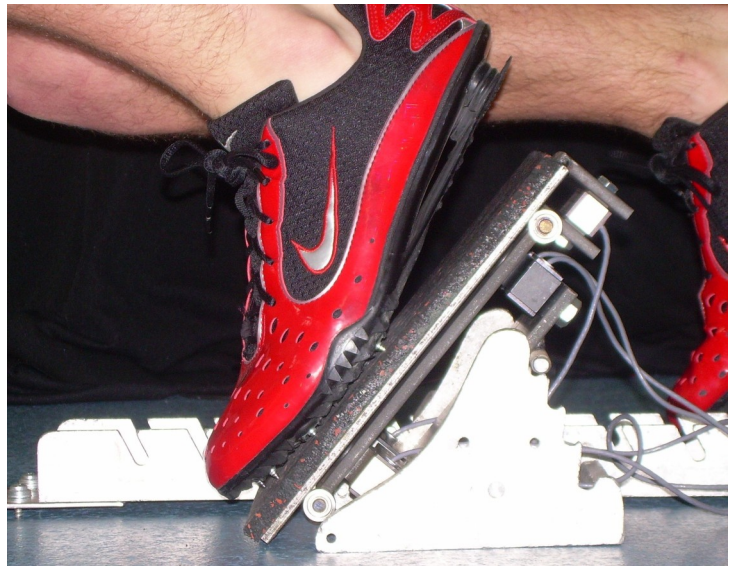
During the spring of 2008, I began to review literature of studies conducted on the sprint start in track and field. To my surprise, I found that the sprint start is one of the most studied aspects in sprinting and collective knowledge on the subject continues to grow.

For my own study I had an idea brewing in my head that I wanted to be able to measure the forces sprint athletes impart onto the starting blocks. As I read I found that there were two ways that this had been accomplished in the past, each having its own drawbacks. The first is to mount a set of blocks to a standard force plate (capable of measuring force application in 3D) like the one available in the HPL; the main drawback to this method is having to perform the study in a small, space-restricted site such as the HPL. (I was set on keeping my subjects on a track.) A second more recent development has been the production of commercially available force-sensing starting blocks. This appeared to be the way to go; a set of portable blocks that would accomplish everything I needed. However, the downside was that they cost upwards of \$20,000. Clearly the limited utility of such a specialized piece of equipment was not cost effective in the long run for this lab.

To solve the problem, Dr. Street and I literally went to the drawing board where our goal was to design a cost effective solution. The main building blocks for the project were individual load cells. These particular load cells were capable of detecting changes in force production in the plane that is perpendicular to its contact surface. Our introductory design for the blocks placed four load cells on each foot pedal to measure the “normal” force.

Later it was decided that we needed to modify the design to add a fifth load cell on each plate that could measure the “shear” force on the block. The final scheme used in my thesis data collection included a signal conditioning system to amplify and convert the analog signal to a digital signal that can be read by computer software. All said and done, the starting block system minus the computer and software cost the lab less than \$6,000, a much more reasonable expense for a lab like our own.

I plan to present this build project and story at the National ACSM meeting at the end of May to motivate others who might have similar types of research aspirations and challenges that appear to be blocking their goals.□



A close up view of Sam's instrumented starting blocks in action.



Part of the HPL family at a tailgate party in the fall of 2008

HPL will Celebrate 40 years of Service

Come help us celebrate 40 yrs of service to SCSU and MN during Homecoming 2009 (Sat. Oct. 10th) Look for more information on the SCSU and HPL websites coming this summer.

CONGRATULATIONS!!

The faculty and staff of the Human Performance Laboratory would like to acknowledge and congratulate

Nate Hendrickson

who completed his thesis work and earned a Master of Science degree in 2008.

IS IT EASIER FOR MEN TO SHED THE POUNDS?

~ April Kuschke

How often have you heard that women have a more difficult time losing weight than men? I can't help but wonder if this is real. Is there a physiological explanation? In October, we attended an NACSM conference where we had the pleasure of listening to Dr. George Brooks, a professor and widely recognized researcher from Berkeley, CA. He presented studies supporting the so-called paradox that women utilize fat better than men while exercising; yet, they have a harder time losing weight.

During exercise, we all burn calories at a faster "metabolic" rate than at rest. Research presented by Brooks, suggests a male's metabolic rate remains elevated after exercise. Whereas, a woman's metabolic rate returns to resting values almost immediately. The difference between males and females may be in metabolic rates. However, Brooks did not provide a good explanation as to why this phenomenon occurs. Without an explanation as to why this difference occurs, it was hard for me to believe that women have greater difficulty losing weight.

In December, some of us attended another Nutrition and Exercise conference with internationally known sports nutritionist Nancy Clark and exercise physiologist William Evans. Clark and Evans question the concept of a significant difference between metabolic rates of men and women after exercise. However, they recognize that men may burn more calories than women. A possible reason for why men's caloric expenditure remains elevated slightly longer than females after exercise would be that men often have more muscle mass (fat free mass).

Fat free mass (FFM) is the largest determinant of an individual's metabolic rate; the more FFM a person has, the more calories s/he will expend during any given task. If being stranded on an island or walking in the desert without food or drink were the tasks, a low metabolic rate would be desirable and women have the advantage. But when it comes to losing weight, men have the advantage.

Some research would suggest differences do exist; however, what makes the most physiological sense is that the differences between men and women are not large. Anatomically, evidence suggests men lose weight more easily because they have more FFM. So if you have some unwanted weight, think about increasing your FFM to help you burn it away!□



Graduate student April Kuschke with presenter Dr. George Brooks at the Fall NACSM conference in October 2008.



Best Wishes Seifert Family!!

The entire HPL would like to say thank you and send good wishes to the Seiferts, now living in Montana.

Dr. John Seifert received an offer from Montana State University that was just too good to pass up. So he and his family are now enjoying life in the mountains. We miss him and we will always appreciate his contributions to SCSU during his tenure here. Go Bobcats!!

FUN PHYSIOLOGY FACTS

~ Mindy Hansen

- ◆ The average sedentary person uses between 70 and 80kg of ATP (your body's energy currency) for a day's worth of activity. That's between 155 and 175 pounds of ATP!!
- ◆ Each ATP molecule (your body's energy currency) that you have is recycled about 300 times a day.
- ◆ If you have an average heart rate of 70 beats per minute and you live to be 85, your heart will beat **at least** 3,118,752,000 times!
- ◆ Nerve impulses can travel through your body at speeds upwards of 250 meters per second. That's 560 miles per hour!
- ◆ Did you know that your kidneys filter about 200 quarts (or 50 gallons) of blood every day and only produce about 2 quarts (~half a gallon) of waste? That's an amazing filter!
- ◆ There are 3500 calories in one pound of fat; if you have an extra 10lbs of fat, you would have enough energy to walk from St. Cloud to the Mall of America at least twice on that extra 10lbs!



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THANK YOU, THANK YOU, THANK YOU!!!!



The staff and students at the HPL greatly appreciate the financial support so many of you have provided over the years. We are always so gratified to know that you believe in our work enough to personally invest in it. We thank the following people who made contributions to the Adult Fitness Program in 2008.

Dave and Nancy Bacharach

Ray and Phyllis Collins

Janice Engebretson

Curtis and Betty Ghysin

Norm Gregerson

Robert Gregory

Sonya S. Hanson

Rick Jones

Ken and Sally Kelsey

Louis Krippner

Tom and Mille Lembeck

Marie McConnell

Mary R. McKenzie

Frank Morrissey

Ruth Nearing

Harry Olson

John Pike

Pat and Sid Prom

Sherwood and Carol Reid

Timothy Schuchard

Eleanor Street

Glenn and Nancy Street

Suzette E. Sutherland, MD and

D. Bradford Neary

Stephen and Elaine Thrune

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