GOLF BIODYNAMICS INC.

GBD Newsletter

VOLUME 3, ISSUE5 OCTOBER 02 2009

SPECIAL POINTS OF INTEREST:

- New GBD Software

INSIDE THIS ISSUE:

The Longest Golf Course in the World Opening soon…

GBD Software: a new beginning

by Dr Robert Neal

The new GBD software is almost finished with the release of the Beta version to GBD Team Members this week. Developing our own software has been the goal since the beginning; in reality it has been a long and tedious process (over 3 years of programming and numerous setbacks) but at the same time tremendously rewarding.

During the last few months I have been sorting out the last few bits and pieces necessary for the 1st release including the calculation and animation of the motion of the forearm based only on measurements of the hand and arm. While the mathematics was correctly written for this modelling over 18 months ago, it was not until recently that I was able to test that it was working. Unfortunately the programmers did not write their initial code correctly, but after a couple of sleepless nights, pouring through lines and lines of C#, we found the problem and now it is operating as expected! I cannot imagine how difficult this process would have been had I not had such a good grounding in 3D mechanics.

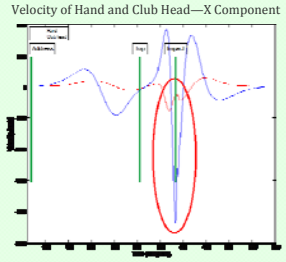
As many of you are aware, I did not want to 'release' without our own meshes (these are the objects that move around on the screen to look like a person swinging!). My first attempt to get our own meshes was not particularly successful. I paid a programmer in India (recommended by the company that has done all the software programming to date) to complete them. Unfortunately they were not sufficiently skilled. Next, one of our team members, Rui Raposo and a friend of his, spent considerable time working on them. They made good progress but in the end, could not finish the task. My next option was with one of the graphics designers Dustin Eatchel who works for JC Video. He made good progress too but it was hard for him to devote sufficient time! In the end, I bit the bullet and invested time in learning a little bit about a piece of software called 3D Studio Max. While I am still a novice, I have learned enough to finish off Dustin's work and we have a set of meshes now that, while still a little primitive, will be satisfactory until I can find more time to learn about rendering and improving the lighting and skin that overlays the framework. The end game will be to allow you to be able to take a digital photo of the client and "wrap" it around the mesh! Ultimately, we will get to the stage where rather than six or seven discrete objects (meshes) that bounce around the screen, we will have one mesh that looks like a human body!

I have been using the software for approximately 6 weeks now and am very happy with its ease of use. While the pointer calibration method does take a little longer to complete as opposed to the old 'snap calibration' method, it still only takes about 60 s. If a sensor moves during the capture process, it is an easy process to re-calibrate it without going through the entire calibration procedure.

Report generation is now a VERY simple task, plus we have the flexibility to complete a report on any number of files or even just on data that are in memory. Hit one button and the results are almost instantaneously available! Please be aware, there will be a need to 'redo' the corridors for all the linear variables (sway, lift/drop, thrust). With assistance from our GBD Team it shouldn't take too long to make this adjustment.

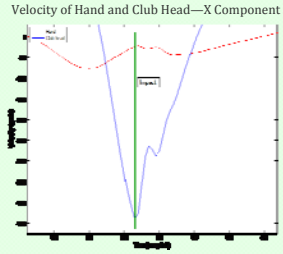
During the process of re-writing the software I have been investigating different algorithms to determine when impact occurs. I have come up with a completely new way of determining impact based not on the position of the left hand sensor but instead, on the velocity profile of the lead hand. With access to the unfiltered data coming from the Polhemus tracker (Liberty Hardware), I have figured out a way to search for that instant where the hand experiences a deceleration that is brought about by impact with the ball. The concept sounds simple but in fact, programming a computer to do it (and get the right answer every time) has been difficult. While it still does not get it perfect every time, we now have a much more realistic estimate most of the time, for impact. For those cases where the algorithm does not seem to work correctly, there is a manual over-ride that allows the operator to change any of the key samples (**A**ddress, **T**op, **I**mpact & **F**inish). In the graph below, I have circled the "event" that we are looking for and in the graph below I have "zoomed-in" or magnified the data.

Velocity of Hand and Club Head—X Component



The 'Event'—looking for the instant where the hand experiences a deceleration brought about by impact.

Velocity of Hand and Club Head—X Component



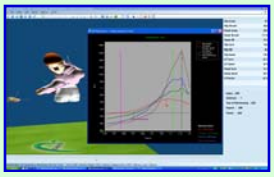
New GBD Website Coming Soon

For the initial testing I had a sensor on the club shaft and the hand. It is relatively easy to pick out the change in velocity of the club when it strikes the ball, but you can see how subtle the change in velocity is at the hand. Suffice to say that I was able to develop an algorithm that seems to be fairly robust.

There are at least four major breakthroughs with the new software:

1. It runs within the Vista operating system (and of course XP and earlier versions of Windows).
2. All the analysis, reporting and biofeedback functions are available within one application.
3. The animation is ALWAYS visible – that is, it does not stop when data are being captured from the tracker as it does with the AMM/TPI software.
4. You can create reports, write in comments and then email them to your client from within the GBD software.
5. Side by side comparisons are now possible!

There are far too many new features to list them all but I hope that you get to enjoy this product either as a user or an operator or both (like Jim McLean!).



Cheers Rob

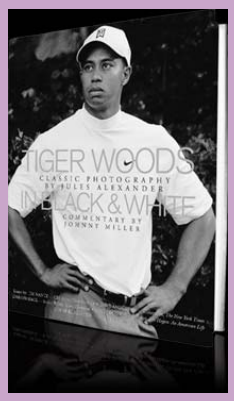
Earlier this year the European Boys Team Championships were contested at Golf Club de Pan, Utrecht, Netherlands. In a close match, Denmark beat Germany 4-3 to take the crown. Our allegiances are torn since GBD has worked with both the Danish and German Boys Teams for the last 3 yrs. Congratulations to both Teams!

Recently tested at The Jim McLean Golf School at Doral (Miami, FL) a certain Australian golfing icon. Needless to say it was an impressive display of ball striking. What were the stand out characteristics of his swing? Most impressive was the exemplary timing sequence and very high hand speed (26.4 ft/sec). Hip speed (379 degrees per sec) was however somewhat lower than expected and the hip tilt at impact (5 degrees) was also lower than our ideal corridor. Did we suggest changing anything...no.

Congratulations to GBD Student Casie Cathrea, a freshman at Livermore High (California) who qualified for last week's CVS/Pharmacy LPGA Challenge at Blackhawk Country Club. Cathrea, 13, beat LPGA Tour veteran Nicole Jeray in a playoff to qualify as she shot par on the par-4 18th and Jeray bogeyed the hole at Blackhawk. Both shot 1-under 71s. The tour allows events to let one amateur into its Monday qualifiers, and tournament organizers chose Cathrea, who is a junior merit member at Blackhawk. While she did not make the cut, she remains the second youngest to play in an LPGA event (behind Michelle Wie) and the youngest to make a hole-in-one — the first day on hole number 12. Well done Casie!

http://abclocal.go.com/kgo/story?section=news/local/east_bay&id=7031573

http://www.insidebayarea.com/trivalleyherald/localnews/ci_13404471



The new collection of black and white photos of Tiger Woods from Jules Alexander

Jules Alexander grew up in New York and by the early 1940's was taking photographs of jazz greats Benny Goodman and Frank Sinatra. He later served in the Navy as an aerial reconnaissance photographer in the South Pacific and upon returning to NY became a top fashion and advertising photographer.

The turning point in Jules's career came in 1959. He was, by this time, fascinated by the game of golf and travelled out on a self-appointed assignment to the US Open at Winged Foot. The black and white images of Ben Hogan captured by Alexander that week are now legendary. In 1994 the "Hogan Mystique" was published showcasing 70 magnificent black and white photos of Hogan, many from that week in 1959.

Check out his latest publication ~ ***Tiger Woods - Classic Photography by Jules Alexander - in Black and White,*** *a magnificent collection of photos of one of the world's best athletes.*

The photos are supported by essays by Jim Nantz, Johnny Miller and some much respected sports journalists. Well worth a look!

Rob and Karen visit Jules Alexander at his home in Westchester NY

For more details visit:

http://www.julesalexander.com/tigerwoodsbook.html

literature review

The Role of Feedback in Promoting Deliberate Practice and Skill Retention

In examining great performance we must look at what separates a good performance from a truly exceptional performance. In doing just that, many researchers and journalists are now suggesting that what really makes the difference is a highly specific type of practice or training which has become known as deep practice or deliberate practice. Geoff Colvin tells us in his book ***Talent is Overrated*** *that "deliberate practice isn't the kind of hard work that your parents told you about. It's difficult. It hurts. But more of it equals better performance. Tons of it equals great performance".*

In ***The Talent Code****, Daniel Coyle actually gives us the physiological explanation for the success of deep practice based on recent research and how it can increase skill up to ten times faster than conventional practice. Here we begin to understand the role of myelin in this fascinating story. Think of myelin as the insulation that wraps around our nerve fibers (the white matter); it works to increase the speed, signal strength and accuracy of the neural firing mechanism. Thus, "the more often we fire a particular circuit, the more myelin optimizes that circuit, and the stronger, faster and more fluent our movements and thoughts become".*

So, with increased amounts of a certain type of practice, layer upon layer of myelin gets laid down around our nerve fibers. The more we develop the circuit, the more automatic the skill becomes. This process is a slow one. And this deliberate practice requires that we make mistakes. Many experts agree with the estimation of at least 10 000 hours of deep or deliberate practice to become an 'expert' at virtually anything.

Generally speaking, in learning a new skill we must extend ourselves beyond what we have been previously capable of performing. A good coach encourages the following process during learning: the student explores a little, makes mistakes, acknowledges and then works to correct those mistakes. The universal instinct is to slow down the new movement at least initially, often breaking it into its most basic components. Then work begins on mastering each component and finally taking a look again at the task as a whole. Finally, work is done to speed up this new movement/skill.

One of the keys to successfully promoting this process of deliberate practice is the manner in which 'feedback' in training is provided by coaches. As we find ourselves utilizing 3D technology and audio biofeedback more regularly to facilitate technical change, we should examine this mechanism for change more closely, asking ourselves whether in fact we are supplying this feedback in the most effective manner. If this 'augmented' feedback is not provided in a way that reinforces the concept of deliberate practice, we may find some of our coaching methods falling short of the mark.

Traditionally, augmented feedback (verbal, visual, audio) in coaching has been provided as often and as soon as possible following execution of the 'new' movement skill in such a way as to reduce performance errors. But is this a true learning effect? And are learners becoming too reliant upon augmented feedback in order to correct the movement errors? We already know that cognitive processes play an important role in the early stages of skill acquisition, and this seems to fit in with the concept of deliberate practice.

Past research in motor learning has focused on the use of certain coaching strategies in order to ensure skill retention rather than simply improved performance during practice. Yes, there is a difference! Some of the conclusions on augmented feedback and practice regimes made by Lee et al in a literature review on cognitive effect and motor learning are listed below:

1) Low relative frequency of augmented feedback may be an important variable in learning better than high relative frequency. Thus, encouraging the learner to interpret their own performance by reducing the relative frequency of the feedback positively affects cognitive effort;

2) Fading the relative frequency of feedback over the course of the practice has been shown to be an effective strategy;

3) Relatively good skill retention has been measured following practice in which augmented feedback was made following a delay;

4) Encouraging the golfer to estimate their own augmented feedback has value (suggesting that there is a cognitive effect in attempting to learn to interpret their own intrinsic feedback);

5) Augmented feedback is most beneficial when it serves to encourage the golfer to learn self evaluation skills using sources that will be available during competition;

6) Random practice (e.g. hitting to different targets in random order) often results in much poorer acquisition performance than blocked practice (e.g. hitting several consecutive shots to a specific target) but better acquisition on skill retention tests. Thus, random practice may encourage a learner to compare and contrast the methods and strategies used for performing the different tasks better than repetitive type practice.

Obviously the goal of most learning situations is for the learner to become somewhat independent of the teacher. And as coaches, one of our goals is to provide feedback as a 'reliability check' to ensure that intrinsic sources of feedback are being correctly interpreted by the learner, hence ensuring a positive learning situation. In effect we must educate the learner about learning!

In the next newsletter we'll look to create some positive recommendations in order to better plan and conduct an audio biofeedback session with a client when the focus is squarely on bringing about technical change.

References:

Lee D.L., Swinnen S.P., D.J. Serrien. ***Cognitive Effort and Motor Learning*** *(1994).*

Colvin G., ***Talent is Overrated****, (2008).*

Coyle, D., ***The Talent Code****, (2009).*

DJGA - Developing Junior Talent

At just 14 yrs of age Daisy N. is now in the Danish National Development Squad

From Left: DJGA Coaches Peter Thomsen and David Dickmeiss

Exercise session with by Physiotherapist Martin Lauridsen

Is there a formula for developing world class golf athletes? How do we ensure that promising young golfers make that often difficult transition to the elite ranks and perform consistently well at a senior level? In many other sports the formula for success has, over the years, become better and more clearly defined. With increasingly more sports science input, improved training techniques and superior coaching, sporting performances in general are continuing to improve and surpass those of less than a decade ago.

Collectively, we have, in fact, been researching what makes successful people great performers in their chosen sport, profession or hobby for more than 150 years, yet we are still working out the best way to develop successful golfers at an elite level consistently. It goes without saying that a combination of hard work, disciplined practice, motivation, athletic ability, physical conditioning, mental toughness, good coaching input and sports science support – are all extremely important ingredients. But the exact recipe remains an elusive holy grail for many golf coaches and their prodigies.

That's not to say there haven't been breakthroughs however. Interest, research and development of junior talent in golf has flourished all around the world, particularly in the years since Tiger's rise to greatness. There are definitely some hotbeds of success. Traditionally, Australia has had a good record of producing talented players that can perform on the world stage and most recently South Korea has taken the spotlight with an unbelievable explosion of young female golfers onto the LPGA Tour.

Numerous individuals, groups and institutions around the globe, including TPI, who recently jumped on the bandwagon, are now expounding the virtues of long term athletic development (LTAD) as a way forward.

While not a new concept in sport, its widespread application to golf has probably had a rather slothful start in most quarters. The Royal Canadian Golf Association is one group that seems to be leading the way.

They now have a well researched and documented development plan in place for their young talent, and other countries are following their lead. Often, we discover these talent hotbeds in seemingly the most unusual of places.

One of the most promising Junior Programs for golfers we have come across in recent years is located in the nation boasting the world's happiest people - Denmark. At a senior level they have great system in place to support and nurture talent. The Danish National Team can boast many successes at an amateur level and a steady progression of players onto the European Tours. As recently as July this year, the Danes won the European Boys Championship Event narrowly beating out Germany for the title. Let's take a closer look at what a couple of ambitious and highly motivated young Danish teaching professionals are accomplishing in order to develop talented young golfers in their own country. The results are already promising.

The ***Danish Junior Golf Academy*** (DJGA) is described, very simply, as a project for young talented golfers. A holistic and well-balanced program at its core, developing junior golfers for elite level competition is the end game.

The role of golf coaches in the DJGA is to create an environment where all participants are goal oriented and enthusiastic. The instructors also work diligently to develop a sound knowledge base covering most aspects of the game, but they also recognise that as a group they do not possess expert knowledge in all the areas necessary to fully develop their young charges. In the fields of biomechanics, physical training and LTAD concepts, sports psychology, nutrition and even some aspects of the short game, putting and club fitting, experts are brought in to instruct in their respective areas.

Not only do they understand the necessity for the nature of an integrated development program that includes sports science support for their athletes, but they understand the importance of all programs being individualised with measurements of a student's progress recorded at regular intervals. Whether it is 3D movement analysis or physical screening sessions, each step is carefully documented and discussed amongst the group. Communication is key. Park the egos at the front door – there is no 'I' in this TEAM!!

As the demand in Denmark to become a DJGA player has grown, the structure of the organisation has morphed to mirror this change, reflecting an inherent ability to adapt. Currently there are three different levels of representation for golfers within the DJGA: Regional DJGA player, National DJGA player and finally the Elite DJGA player. This elite group is primarily reserved for those players who reach National Level competition. The idea being that the 'support' will continue when they join the professional ranks. There are 11 players to date, who have reached this point.

As the DJGA continues its expansion, the ultimate aim is to positively influence the way in which Danish golfers are developed from an early age. Furthermore, their goals include developing a team of professional golfers that travel and practice together. The success of the team then becomes a source of inspiration for others, igniting the flame of ambition.

David Dickmeiss and Peter Thomsen are the two golf professionals spearheading this approach for the DJGA. The organisation, from humble beginnings now has, 5 years down the track, a total of 110 juniors supported by a staff of 8 coaches and numerous 'experts'. The standard of the players under their tutelage has increased dramatically in a relatively short period of time. In fact, 4 of the 6 boys from the winning 2009 European Boys Team Championship take part in the DJGA program. With several National Championships and dominance in recent national tournaments under their belt, the future of the Danish Junior Golf Academy looks assured.

For more details on the DJGA Program please contact David Dickmeiss david@nyholm-golfacademy.dk or Peter Thomsen peter@nyholm-golfacademy.dk

New Book and Website

Top Teaching Professional Jim McLean has just released his newest book. Entitled The Slot Swing, it reveals how we can all learn to swing a golf club using the same techniques that made Ben Hogan, Byron Nelson, Jack Nicklaus, Lee Trevino, Nick Price, Lorena Ochoa, Jim Furyk, and Tiger Woods champions. Simple text and superb illustrations (hand drawings by Phil Franke) help the reader to the conclusion that there is no perfect swing, but there is a 'perfect slot'.

Jim McLean describes the secret to a great golf swing as finding the 'slot on the downswing'; in other words finding the most effective delivery position. We all understand that golfers display a variety of different swing shapes especially with regards to the backswing, we discover however that remarkable similarities exist amongst the best players in the world as they approach impact. These positional 'corridors' for the hands and club have been deemed 'the slot'. Jim goes on to describes the three ways to swing the club back (thus providing the individual swing differences for each golfer) and still find the 'slot'. He refers to top performers to illustrate his point in each case. A good instructional book for all golfers.

Also check out Jim's new website *The Golfers Nation*. Described as the internet golf channel, it provides instructional videos, interviews, tips and swing analysis of some of the top players.

http://jimmclean.com/GolfersNation/TheGolfersNationHome/tabid/660/Default.aspx

Spotlight on GBD Team Members

The spotlight is now on our colleague in Adelaide, Australia - Ben Corso.

Ben Corso is a Post Graduate trained Manipulative Physiotherapist whose main areas of interest include musculoskeletal, orthopedic and sports physiotherapy and of course, he is an avid golfer. A member of the premier golf club, The Grange (Adelaide, Australia) for over 15 years, Ben maintains a low handicap of 9.

Ben first graduated from the University of South Australia in 1995, following this with a Masters Degree from the same University in 2002. An extremely bright student, Ben won many awards during his university years including Dux of the Year and Most Outstanding Graduate.

Between 1995 and 2002, Ben gained extensive experience in the public and private sectors both in Australia and the UK. Towards the end of 2002 he established two practices, ***North Adelaide Manipulative Physiotherapy*** and ***The SA (South Australian) Golf Injury Clinic*** which is ideally situated in the professional shop at The Grange Golf Club.

Spending the better part of the last decade developing expertise and

The SA Golf Injury Clinic location at The Grange Pro Shop

knowledge in golf, Ben is particularly interested in the biomechanics of the golf swing and how technique relates to injury.

Both his practices are multi-disciplinary also including Massage, Podiatry and Pilates services. All members of his team work with a variety of golfers from the club golfer to touring professional. They were even named as the Official Physiotherapists to the World Amateur Golf Teams (Men's and Women's) Championships in Adelaide last year!

Ben is regularly involved with a number of junior golf organisations and has experience with elite developing players having worked with South Australia's State Squads since 2004.

This year, Ben added another string to his bow, becoming part of the Golf Biodynamics (GBD) Team. Now he uses a state of the art 3D System to assess the golf swing mechanics of his clients.

3D Swing Analysis -Testing out the new GBD software at the SA Golf Injury Clinic

He says "It helps complete the picture, leading to a better understanding of a golfer's swing faults, the etiology and the GBD Report also highlights the physical links which often underpin the technical problems. The ultimate goal is to work hand-in-hand with the golf coaches to optimize performance and prevent injury by applying specific exercise interventions".

Currently, Ben is collaborating with some of Australia's leading Golf Physiotherapists in order to develop a standardised golf screening protocol, applicable to all golfers from junior to elite level. The goal is to have this system adopted as the gold standard by which physical evaluations of developing young golf athletes are made.

And now with both Titleist Performance Institute (TPI) and The Golf Athlete (TGA) qualifications, Ben is moving fast towards becoming a world class golf practitioner.

FOR MORE INFORMATION:

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With The Golf Athlete Team from left: Matt Green, Rob Neal, Michael Dalgleish, Bill McTigue and Ben Corso.

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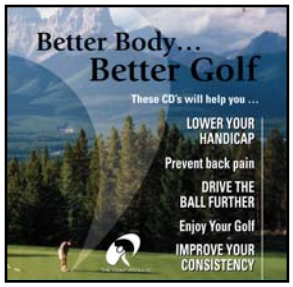

Want to know more about linking the physical issues to the technical problems in the golf swing? How to perform screening tests to identify the problem? What exercises should be prescribed? Consult the premier guide based on sound scientific principles and used by physical therapists all over the world — the *Better Body Better Golf CD* from The Golf Athlete.

TGA and GBD Seminars & Events

September

USA—New York Events:

19th	*Trump National Golf Club - Colts Neck (New Jersey)*
20th	*John Callahan Teaching Academy (Connecticut)*
22nd	*Kima Wellness and Physical Therapy Center (Manhattan)*
24th	*Metropolis Country Club (Westchester)*

October

Germany:

8-11th	*German National Team—Men and Boys*
14th	*Berlin-Wannsee*
19th	*Day Seminar—Biomechanics (GBD)*
20th	*Walddoerfer Golf Club*

England:

29th	*Golf Biomechanics Presentation Birmingham University (Rob Neal)*
31st/1st	*The Golf Athlete Level 1 Seminar (London)*

November

Switzerland:

7-8th	*The Golf Athlete Level 1 Seminar (Zurich)*
9-10th	*2 Day Seminar— Advanced Biomechanics Seminar for Coaches (GBD)*

Singapore:

12th	*Singapore General Hospital Lecture*
13th	*Junior Academy Training with PGA Professional Phil Brew*
14th	*Singapore Sports Council (TBC)*
15th	*1 Day Allied Health Seminar (TGA)*
16th	*1/2 Day Golf biomechanics Seminar (NSRCC)*

Australia:

28-29th	*The Golf Athlete Level 1 Seminar (Melbourne)*

December

Australia:

3-4th	*The Golf Athlete Level 1 Seminar (Gold Coast)*
5-6th	*The Golf Athlete Level 2 Seminar (Gold Coast)*
12-13th	*The Golf Athlete Level 1 Seminar (Sydney)*

USA—Florida:

15-22th	*Publix Junior Tournament (Doral Resort)*

The Longest Golf Course in the World

For those golf enthusiasts seeking the ultimate challenge in their beloved sport, Australia now offers the world's longest golf course!

Stretching over 1,365 kilometers (848 miles) of desert highway, The Nullarbor Links boasts 18 holes in as many different towns and/or gas stations. When completed (its inaugural tournament is scheduled for October 22, 2009), the course will span two time zones and measure a distance greater than the entire length of Great Britain!

Each hole will include a green and tee and feature a natural, outback-style fairway. No bent grass here folks!

The par-71 course is expected to take three or four days to complete with each player being awarded a certificate after holing that final putt. Golfers can expect at least one roadhouse stop before playing a hole, and then a drive of 100 kilometers to the next tee.

The course, conceived five years ago "over a couple of beers," by Bob Bongiorno, is designed to attract tourists to the Eyre Highway, which crosses a stretch of desert called the Nullarbor Plain and a section of Australia's southern coastline. Don Harrington, the project chairman says "This is the longest golf course in the world. It's unique terrain, there's something for everybody."

Each hole will showcase local attractions, from whale-watching to ancient fossil beds, a working sheep station, and will include sights such as the Big Kangaroo statue at Border Village straddling South and Western Australia.

Beware the sand traps – they are a major feature of the course!

Players are required to purchase a Score Card for a cost of $AUS 50.00. Golfers can hire golf clubs at each 'stamping point' and they cost only $5.

For more details on playing the world's longest golf course check their website:

http://www.nullarborlinks.com/