

## **Gold for Biofeedback: Abhinav Bindra wins India's first ever individual Olympic Gold Medal**

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I first mentioned the "G-word" to Abhinav after a training session at my house in South Africa in early July. I don't often talk about results to clients, but we had just completed an advanced respiration session (using a technique I had learnt from Bruno Demichelis from AC Milan) that demonstrated such a close link between control of heart-rate and shooting outcome, that I finally began to feel that we had cracked the code of shooting success, and a gold medal was a possibility.

As a sports psychologist, disappointment and failure is part of the job. I have been greenside at the British Open and watched a client's putt slide past the hole, causing him to miss the cut, and I have commiserated with a sprinter who ran fractions of a second too slow to make it into the Olympic team. I've even worked with a hockey team who missed every single shot in a penalty shootout - and were the only team with a sports psychologist at the tournament!

Obviously there are successes also, but in any career, being part of an Olympic gold medal team is a highlight. I do want to say though, that for 10 years as a sports psychologist, I have been saying that character counts more than results, and when I think of Abhinav, it is his character that I admire rather than his gold medal. Talent, hard work and good planning gives you a chance, and from there, sometimes it goes your way, sometimes it doesn't. This one went our way.

Abhinav and I were introduced in December 2007, and began working together in South Africa in February 2008. Our Olympic plan was formulated at a kitchen table in my mother's house. The team grew to include a doctor, chiropractor, physiotherapist, dietician and two shooting coaches in addition to myself. Looking back, I would say the crucial ingredients were a combination of bloody mindedness and flexibility.

Abhinav is an athlete who will stop at nothing to achieve success - one of the two or three most determined athletes I have ever met. So it was a privilege to work with someone who would implement whatever he was asked to do. As someone who grew up in the 80s watching the A-Team, I have to say that I love it when a plan comes together. In 2006, PGA teaching professional John Dickson and I began to formulate a theory of how and why emotional states impede technical skill execution. We called this theory psykinetics. It draws upon evolutionary psychology, sensory integration and psychophysiology, and once you're talking psychophysiology, you need to be practicing with biofeedback.

I use a FlexComp Infiniti hardware system with BioGraph 4.0 software. Shooting is a peculiar sport because of the lack of movement, and air rifle is the most precise and exacting of the shooting sports. I chose the FlexComp because it allowed me to

seamlessly move between training modalities and multimodalities, and the BioGraph software because of its ability to measure and provide feedback. The system plus my laptop is small enough to pack into a Pelican carry case, which is useful for travelling. The psychophysiological requirements of shooting include:

- Controlled breathing and heart-rate
- No excess tension in muscles
- No fluctuation between sympathetic/parasympathetic states during triggering (*shooters can shoot in sympathetic or parasympathetic, but don't want to be surprised by which state they are in*)
- No interior monologue
- Sharp focus and good reactions to trigger at the moment when the sight image is correct.

Abhinav and I started with the biofeedback slowly. I believe breathing is the best place to start a biofeedback programme, then skin conductivity and temperature control. We distinguished between training 'in the chair' and while shooting. Looking back, I would have started even slower, and with more time in the chair. But something that worked well for us was my consultative approach. Abhinav was already a world champion when he came to see me, and has the highest degree of body awareness that I have come across in an athlete. So I was able to get a wealth of information from him, and continually adapt the programme to the requirements of the time.

In the end, Abhinav accumulated over 150 hours of training on the various modalities. We found that the sport was too subtle for EMG and SC, but EEG and HRV gave useful information. Shooters hold their breath during triggering, and need to learn how to have a controlled parasympathetic response just before triggering, even though they may feel short of air. In the EEG, we found alpha training at T3 useful, and after lots of experimenting, ended up mainly rewarding 15-18 at Cz and squashing 26-30. We also trained Pz and Oz. The balance was to find a state that had him muscularly relaxed, but still allowed him the sharpness of reaction to trigger at the right moment.

I came to feel that with biofeedback, you do not train the athlete to execute the skill; you train the athlete to prepare to execute the skill. I.E. you should be training for the state prior to skill execution (3-5 seconds before) rather than the state of skill execution. Skill execution itself is short, subtle and instinctive, and difficult to describe or quantify ... and really is best left alone. Rather train the athlete to lay the foundation for skill execution. Importantly, we did an extensive QEEG study, and discovered amongst other things, a T3 alpha ERD with triggering. Given that we were investigating an elite athlete, a researcher may have concluded that this ERD was appropriate, but Abhinav's interpretation of the data was that he was still shooting suboptimally, and wanted an alpha ERS at triggering. It is useful to note that even elite athletes often have lots of room for improvements in their cognitive and neurological processes.

We did neurofeedback training 'in the chair' and while shooting.

The other modality that was powerful was EKG + respiration. The best predictor of a bad shot was heart rate and breathing being out of phase. We trained this in the chair and while shooting also. In the chair, Abhinav would breathe at 2.5 - 3.5 breaths per minute, or would breathe at about 8 breaths per minute, and then breath-hold for 40 seconds, while controlling his heart rate.

While I am an experienced sports psychologist, I am relatively new to biofeedback. It is a strange experience sending a biofeedback trained athlete into a competition, because there's much less to do at the competition venue. You don't need the inspirational little comments, or the relaxing jokes, because the athlete has the tools to do the job, and you can pretty much leave him to get on with it.

It was a privilege working with Abhinav, because of the quality of the feedback I got from him, and also because of the generosity of his sponsor, which allowed us undivided time together in 5 countries and 3 continents. I am a much, much better sports psychologist now than when I started working with him just 6 months ago. Sometimes learning so fast is scary because it makes you realize how much you don't know, but my father always used to say, "You've got to know what you don't know", and it's exciting to be in a field where there is so much to learn.