



Credit: Courtesy of ISSF/Schreiber



Shooting in India

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In

Secrets of Asian Sport Psychology

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Introduction

Shooting sports have become increasingly popular in India with more than 2,700 athletes participating at the 2013 national championships. By comparison, most countries would attract at best only a few hundred competitors to their national championships. The performances of the Indian shooting team have improved dramatically in the past decade, to transform the country into one of the dominant forces in world shooting.

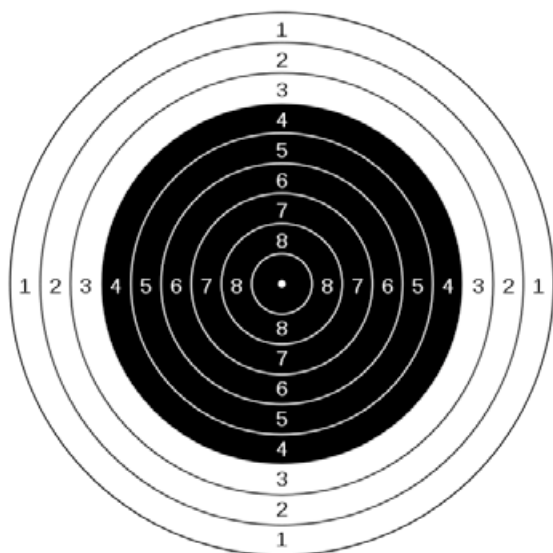
India topped the medal table for shooting at the Commonwealth Games of 2006 and 2010, won an Olympic silver medal at the 2004 Olympic Games, its first ever individual gold medal at the 2008 Olympic Games, and backed up these successes with silver and bronze medals at the 2012 Olympics. There can be little doubt that India has become a force to be reckoned with in the shooting world and looks set to climb to even greater heights over coming years.



Rathore wins Olympic Silver

In this chapter, we explore some of the psychological factors that have contributed to the international success of Indian shooters. Both authors have, at various times, provided psychological support for the Indian shooting team and have observed at first hand the progress that has been made. They have also worked for many years with other international shooters, including the national teams of Australia, Italy, Great Britain, Ireland, Iran, Malaysia, and Singapore. We chronicle the support provided for the Indian shooting team and discuss psychological factors that influence shooting performance. To give these accounts greater authenticity, we have faithfully reproduced the views of the shooters themselves, in their own words where possible, to explain the psychology of sport shooting.

Psychological Demands of Shooting Sports



Credit: Courtesy of Indianshooting.com

Shooting is one of the most psychologically challenging of all sports, requiring a level of precision and consistency that must border on perfection to challenge for medals at the international level. As an example, to score a 10 in the air rifle event it is necessary to hit an area with a diameter of only 0.5 mm (about 0.02 inches) from a distance of 10 m. On five occasions in international competition, men have scored the maximum 600 points from 60 shots, including twice by the Indian shooter, Gagan Narang. On no fewer than 15 occasions have women recorded the maximum 400 from 40 shots, with Indian shooter Suma Shirur among them.

At the Olympic Games, the shooting program includes 15 events, five events each for rifle, pistol, and shotgun, organised by the International Shooting Sport Federation (ISSF). The competition format and regulations of all the events contested at the Olympic Games, World Championships, World Cup Series, and other ISSF-endorsed championships can be found at www.issf-sports.org/theissf/championships/olympic_games.ashx



Suma Shirur

Credit: Courtesy of Indianshooting.com

There is considerable variation between the different shooting events in terms of their specific psychological challenges. For instance, pistol and standing rifle events require, above all else, the ability to remain statue still, with solid body posture yet differentiated muscle tone, whereby the shooter maintains tension in some muscle groups and relaxation in others. The precision inherent in these events is so great that even a heartbeat creates deviation between weapon and target, and so shooting between heartbeats is the required norm.

In comparison to rifle and pistol, shotgun events are much more dynamic, requiring the shooter to move the gun rapidly but smoothly to hit a fast moving target. Hence, when shotgun shooters call “pull” to release the clay target, they need the

precise physical control and empty mind characteristic of all shooting events, but should retain an element of the hunter about them, ready to track and “kill” the clay.

All shooting events demand mastery over physical and mental processes. Excess tension, negative emotions, and random thoughts are the enemy of all shooters.

For many shooters, thinking too much and over-analysing a relatively simple process is a significant and all-too-common problem. As shooting psychologists, we spend much time devising strategies to reduce cognitive activity, trying to assist shooters to maintain a quiet mind, free from the clutter of unproductive thoughts, excess analysis, and self-recrimination. We often wish there were an on/off switch in shooters' brains. The list of things that commonly distract shooters is seemingly endless. Table 1 shows a typical list of distractions reported by shotgun shooters.

Table 1. Common Distracting Thoughts for Shotgun Shooters

<i>The crowd behind me were too noisy</i>
<i>The light changed during the round</i>
<i>The microphones did not pick up my call</i>
<i>I was doing fine until the delay when the trap malfunctioned</i>
<i>Sweat was dripping onto my glasses</i>
<i>Why did that target not break?</i>
<i>I'm shooting so well, this is easy</i>
<i>My heart is beating so fast</i>
<i>I missed my first target, now I'm panicking</i>
<i>I don't like this range</i>
<i>I always have a problem with the second round</i>
<i>The referee is too old to see the targets properly</i>
<i>The targets have not been set up correctly</i>

Adapted from Cei (2009)



Credit: Courtesy of Kevin Kilty



The views of Australia's Michael Diamond, one of the greatest shotgun shooters of all time, on the process of successfully hitting a clay target during flight, offer rare insights into the psychology of shooting. One of the challenges of the Olympic trap event is to have the confidence to allow the target, a 110 mm (4.3 inches) clay disc travelling at 100 km/h (62 mph), to begin its flight, to see it clearly, and to follow its path before pulling the trigger.



Michael Diamond

Credit: Courtesy of Massimiliano Naldoni

Anxious shooters will often “jump the gun,” reacting to the flash of the clay as it leaves the trap house and getting in front of the target. Diamond explains the process:

There's a compartment in my mind, a sight picture. You can actually see everything coordinating together. It almost appears in slow motion ... You can see the little red dot (the sight) on the end of your gun approaching the target, go past the target. You pull the trigger and turn it to dust ...

The trick is, when you're calling for that target, when the target appears, I can see it round, I can see it perfect, like it's sitting just there on top of that trap house ... That's where the game begins and ends. It's won and lost right there. If you don't see it – if you see a flash or a blur – you're done.

If you're looking in the correct spot, the human mind and the eyes can see anything that you want them to. You've got to give them the information so they can process it. It's about shutting out your emotions and your feelings (Coomber, 2008).

Time Management During Rounds

In Olympic trap, a round involves shooting one target from each of five stations and continuing in this manner until 25 targets have been completed. There are normally six shooters on the range simultaneously who call for their target in turn. Shooters know where the target will emerge from but they do not know in which direction it will be heading (left, right, or straight). Each shooter has to wait for about 40-50 seconds between targets or longer if, as frequently happens, a delay

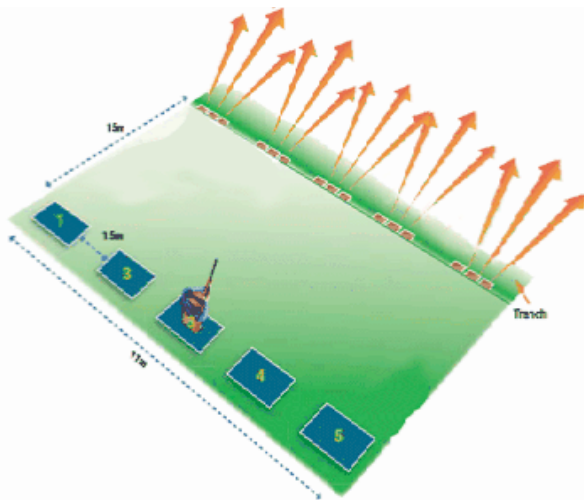
occurs (e.g., the microphone fails to pick up a shooter's call, a trap malfunctions, a target breaks as it leaves the trap house, a shooter claims that a target called a miss by the referee was actually hit).

Time management during a round is critical. A consistent between-shot routine provides the foundation for maintaining focused attention and is universally regarded in the shooting world as a crucial element of achieving international success.

Between-shot routines are highly individualised and there is no single routine that will be effective for every shooter. Some elements of a routine are common to all Olympic trap shooters. In the time between shooting at one target and calling for the next, it is necessary for every shooter to eject the spent cartridge(s), reload, move to the next station, get into position, and raise the gun to the shoulder before calling for the target. Also, at some stage during a round, a shooter will normally tip more cartridges into the pocket of the shooting jacket, take a few sips of water, and towel down hands and face. Idiosyncratic elements of a routine might include switching the gun to the non-trigger hand when moving stations to relax the trigger arm, placing the gun over the shoulder to relax both arms, polishing parts of the gun, or conducting a quick check of equipment by re-adjusting jacket, sunglasses, hat, and towel.

Other more subtle elements of a routine are less obvious, but probably more important. These elements may include maintaining a consistent body language, slow controlled breathing, mentally rehearsing the movement and rhythm of the next shot, saying a silent word of encouragement such as "*trust yourself*," singing silently to avoid random thoughts, and ensuring a brief moment of complete stillness before raising the gun to the shoulder.

In addition, there is a need for mini-routines for specific challenges, such as after missing a target, for an interrupted routine, when a no-target is called by the referee, or when recommencing the round after a delay. For example, the scenario of missing a target will be faced by all shooters; the challenge is to ensure that the damage is not compounded as a result of an emotional response, negative body language, self-recrimination, or thrown cartridges. Routines become especially important during the final five targets of a round, when the potential for a shooter to start considering the score for the whole round rather than the next target grows exponentially and focus on the here and now is often lost.



Credit: Courtesy of the Shooting Academy

timing is absolutely everything

Mental rehearsal of the rhythm of the shot is seen by many as a critical element of an effective routine because it increases the probability of going through the process of calling for the target, seeing the target clearly, moving the gun through the target, and pulling the trigger with a rhythm that is not too fast and not too slow. As Michael Diamond explained, *“I try to stay in touch with rhythm and timing because timing is absolutely everything in our sport”* (Tan, 2012).

Another critical element of an effective routine is to try to reduce the competitive pressure during the walk from Station 5 back to Station 1. This walk is generally seen as a time to take some deep breaths, relax the arms, and to move slowly but purposefully with the aim of arriving at Station 1 ready to refocus attention on the next target. When working with trap shooters, we typically spend a great deal of time helping to identify, refine, and monitor effective between-shot routines until they become second nature for the shooters.



Behavioural Imperatives

Given the disciplined nature of shooting events and the intense psychological challenge of international competition, over the course of 15 years working with Olympic shooters, the first author has developed a series of behavioural imperatives for the trap event in the form of a list of “shooting commandments” (Table 2). The qualities of control, consistency, precision, and patience should pervade the entire performance of a shooter; these commandments contribute to those qualities.

Table 2. List of “Commandments” for Trap Shooting

You compete against a machine; you should try to be a machine. The sport is hard enough without your emotions making it harder.

No reactions are allowed. Show the same response, hit, miss, or second barrel.

A second barrel kill is a gift. Say “thank you” and move on.

Shooting is a small picture sport. Shoot targets one at a time by controlling 25 small pictures and let the big picture take care of itself.

Thinking too much is your enemy. Analysis has its place but not during a round.

The river of your thoughts flows strong. If unwanted thoughts comes floating along, don’t fight them, replace them with the thoughts you want.

Breathing is a key skill for shooting. Learn to control your breathing.

Patience and discipline are your two greatest allies. Your routine will see you through, but ensure that you have a good routine.

If something disturbs your routine or you feel an element of doubt, then start your routine again. Know your restart point.

Learn to love adversity. No shooter likes bad light, wind, or rain. Know that you will handle them better than your opponents.

Your overall performance is defined by your worst round. Show mental resilience when things are not going well.

Poor officiating happens. Stand up for yourself, but do not get frustrated.

Make shooting an oasis of peace even if your life is chaotic. Deal with the other stuff later.

Do not get involved in anything that causes a delay. Wait patiently until the problem is resolved.

Predictions often come true. What You See (in your mind’s eye) Is What You Get (remember WYSIWYG).

Have a clear image of you at your best as a competitor. Give this image a name.

Find a song that sums up your quest and/or inspires you.

Finals Focus

The format of an Olympic trap final gives each shooter only one shot at each target rather than the two allowed during qualification rounds.

As a result, the psychology of a final is different to the five qualification rounds and it is not uncommon for shooters to feel rushed in a single-barrel final. Working to assist a shooter to prepare for the prospect of an international final, the second author was faced with the scenario of a shooter who had previously displayed a tendency to rush shots in finals due to the anxiety of feeling that there was less time to hit the target with only one cartridge. On several occasions this tendency had cost the shooter a podium finish.

The initial suggestion was to mentally rehearse the correct rhythm of the movement a few seconds before calling for the target. Having practiced this strategy during single-barrel training rounds, results were disappointing and the shooter continued to feel rushed. He looked focused and ready to call for the target during these simulated finals, but too many of his shots continued to miss the mark. After further discussion, it became apparent that his external focus prior to shooting was less than optimal. His gaze was too narrow and fixed on where the target emerged. Consequently he saw a flash rather than a clear picture of the target and hence his shotgun movement was too fast and far from smooth.

With this new awareness, the shooter discontinued the pre-shot mental rehearsal that had provided no beneficial effect, and instead adopted a slightly broader focus of attention before mounting the gun. More specifically, he continued to look at the same spot just above where the target emerged, but had a “softer” focus so that his vision was broader, taking in the 2-3 m to the right and left.

The immediate effect of this change was that the shooter saw the target moving more slowly than before, picked up its flight more clearly, and the movement of the shotgun to the target became smoother. Henceforth, this softer focus became a crucial element of his pre-shot routine and he would only mount the shotgun once he had achieved this “open glance” as we referred to it. He became meticulous about spending time to achieve this type of focus on every target and his performance in single-barrel finals improved as a result.



Credit: Courtesy of Kevin Kilty

Case Study #1:

Manavjit Singh Sandhu (Olympic Trap World Champion 2006, World Cup and Commonwealth Games Gold Medallist).



Credit: Courtesy of ISSF/DallaDea

Manavjit Singh Sandhu is India's most successful Olympic trap shooter and one of the world's finest exponents of the sport. His rise to become world champion in 2006 represents, thus far, the pinnacle of a successful career that has also seen him win World Cup and Commonwealth Games gold medals, four Asian Championship titles, and four Asian Games silver medals. He is a 3-time Olympian and the 2007 recipient of the *Rajiv Gandhi Khel Ratna* award, India's highest honour for achievement in sport.

His career in shooting sports started early, after his interest was developed as a child in the footsteps of his father, who was also an international level shooter. Sandhu gives

much credit to the central role played by his parents in providing him with opportunities, during which his natural shooting talent was unearthed, and also for helping to shape his personality. He also identifies a strong desire to win as a third very important dimension pushing him to be involved in sport shooting. For Sandhu, the psychological demands of shooting seem to fit like a glove with what he regards as his inherent psychological characteristics. By his reckoning, most of the psychological skills required to shoot well have always been present, and his years of training have simply optimised them. The longevity of his success, from his first major win at the 1998 Commonwealth Games in Kuala Lumpur, Malaysia, through to his success at the 2014 World Cup event in Tucson, Arizona, points to a strong and continuing competitive nature.

Sandhu regards, as one of his secrets, his superior cognitive attributes, including fast reflexes, good hand-eye coordination, and a natural ability to aim and connect with moving targets. At the same time, he has recognized the truth in the old saying that talent alone is never enough (see Maxwell, 2007), and therefore has long since resolved to work harder than other shooters to develop his natural ability to the highest level of which he was capable. In this respect, he is a classic example of the 10,000 hours of deliberate practice *rule* for the development of world class expertise in sport (Ericsson, Charness, Feltovich, & Hoffman, 2006). The long hours of practice eventually crystallise the essence of successful performance into misleadingly simple words that capture all that has gone before. For Sandhu, and many other great trap shooters, the secret of hitting a 110 mm diameter target travelling at 100 kph in an unknown direction, has become nothing more complicated than "watch (the target) and move."

In tandem with his strong competitive nature and burning desire to win, which is by no means unusual amongst successful people in any walk of life, is his resilience and ability to cope with defeats and setback, a less common and perhaps more valuable attribute, which has been shown to lie at the heart of mentally tough competitors in sport (Crust, 2007). Sandhu is almost the embodiment of poet Rudyard Kipling's famous approach to triumph and disaster, treating these *two imposters* just the same. In his words, "*How to handle victory and defeat is the essence of a sportsman.*" In his reactions to setbacks and disappointments, he retains the attitude that "*one must look at the next opportunity to win after a loss.*" He uses his renowned sense of humour to avoid taking the losses too seriously, instead focusing on the next opportunity to win.

Sandhu adopts a similar approach to victory, taking it in his stride and remaining mindful that every medal won potentially raises expectations for the next victory, leading to self-induced pressure that could have negative consequences. His coping strategy involves not taking the wins any more seriously than the losses, but remaining relaxed and philosophical about whatever the result brings. In the extremely achievement-oriented world of elite sport and given his self-acknowledged competitive nature, this approach is far more easily said than done. That Manav Sandhu appears to achieve such equilibrium of mind, body, and soul is no mean achievement and speaks volumes for his depth of character.

He has roared back into world-class form recently to win the gold medal at the ISSF Shotgun World Cup event during April 2014, where he overcame Michael Diamond in the final and consigned another former Olympic champion, Russia's Alexei Alipov, to the bronze medal. Sandhu reflected that "*Competing head to head with two Olympic champions on a single day and getting the better of both was indeed special. However, I feel that in shooting one simply tries to shoot one's own target and then the score speaks for itself. Psychologically, it can be intimidating shooting against legends, but I did not let that trouble me*" ("Gold shows," 2014). His simple philosophy of focusing solely on the process of hitting his own target successfully and giving no thought to what his opponents are doing has served him well throughout his career.



view video:
*Interview with
Manavjit Singh
Sandhu*



view video:
*Sandhu wins
gold in Mexico*



Credit: Courtesy of ISSF/DallaDea

Time Management Between Rounds

In international competition, there is usually an hour or more between rounds and managing this time effectively plays an important part in determining performance. Typically, coaches hold a post-mortem with their shooters immediately after the round is over to identify the good and not-so-good aspects of the performance. Thereafter the shooters return to their allocated base camp for some down time, to rehydrate, eat a snack, and relax, switching off from the contest temporarily. Some will read a book or listen to music, others will play cards or chat; some are gregarious whereas a few will isolate themselves completely. The strategy used is largely one of habit or personal preference, although the typical routine is for each national team to create its own little oasis of calmness, relaxation, and positivity, providing a refuge from the psychological rigours of the competition, helping the shooters to refresh, recharge their emotional batteries, and refocus before re-entering the fray. Coaches and support staff usually take responsibility for securing the best location for the team “headquarters” and will guard them with terrier-like fervour if another team encroaches too closely.



Around 30 mins prior to the start of their next round, many shooters will schedule a quick massage, after which they will put on their shooting jacket, gather gun and ammunition, and head to the range to refocus and await their turn to shoot. This between-round period is when much of the on-site support from a sport psychologist occurs. It affords time for relaxation sessions, mental rehearsal, venting of emotion, counselling when necessary, or reminders about pre-arranged routines or behavioural imperatives. Part of the art of the sport psychologist is to know when to offer an intervention and when to leave the shooter alone. Holding back and waiting to be asked for advice is usually the best approach.

Mood Profiling

Our moods influence many things in sport and in life. Moods affect how shooters respond to the various situations they might encounter during a shooting competition and, ultimately, how they perform. As part of his consultancy work with international shooters from various countries, the first author has regularly profiled their mood responses using the Brunel Mood Scale (Terry, Lane, Lane, & Keohane, 1999; Terry, Fogarty, & Lane, 2003; see www.moodprofiling.com).

Compared to normative mood data for athletes generally (Terry & Lane, 2010), international

shooters from India, Australia, Great Britain, Ireland, Malaysia, and Singapore have, on average, tended to report lower scores for tension, depression, anger, fatigue, and confusion, and report vigour scores very close to the norm (see Figure 1).

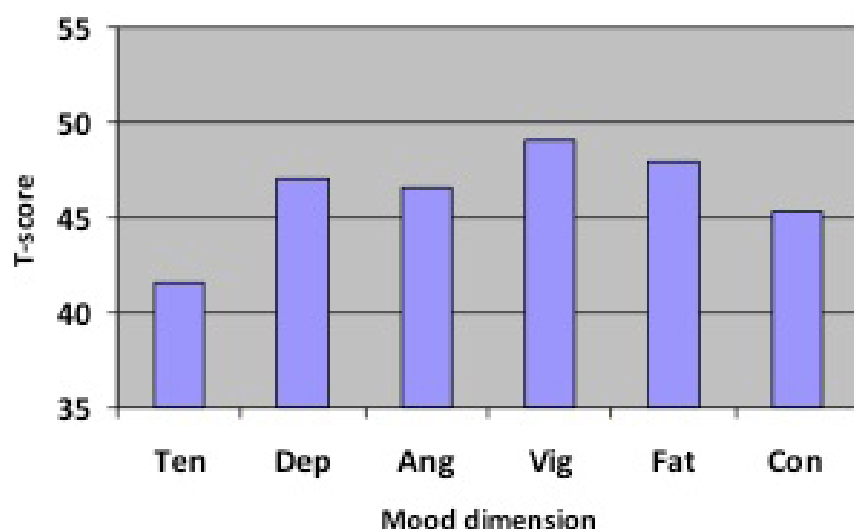


Figure 1. Mean profile of international shooters ($N = 587$) plotted against athlete norms, represented by T-scores of 50 (Terry & Lane, 2010).

This pattern of mood responses among international shooters can be interpreted in several ways. It could, for example, be seen as an indicator of good mental health among shooters (see Raglin, 2001). Alternatively, given that most data were gathered during periods of international competition, it could reflect the tendency of shooters to suppress their feelings, especially negative ones, at such times due to the dispassionate, controlled demeanour required of

them by the demands of sport shooting. Finally, it is possible that the stereotypical personality of the calm, introverted shooter, largely devoid of emotion (Coleman, 1980), is evident in reality and explains the observed mood profiles.

Regular mood profiling of individuals, especially at the competition venue, can quickly help to identify when a shooter's mood is less than optimal. Anger, confusion, or depression scores elevated above what is normal for an individual usually signify a potential threat to performance, as do very low vigour and/or very high fatigue scores. The format of international shooting competitions, where events usually extend over a period of 1-2 days, gives opportunities for intervention in the form of brief, solution-focused techniques (Pichot & Dolan, 2003) or even just an opportunity for a shooter to 'get something off the chest'. The ability to implement short-term mood regulation strategies, for example through humour, music, massage, or just by listening to the shooter (see Terry, Dinsdale, Karageorghis, & Lane, 2006), is a valuable asset for all those who play a supporting role with elite performers.

Case Study #2:

Rajyavardhan Singh Rathore (Double Trap Olympic Silver Medallist 2004; World Cup Gold Medallist 2004, 2006; World Record holder)

Colonel Rajyavardhan Singh Rathore is an officer and a gentleman. Known by most on the international shooting circuit simply as “Chilly,” he became a national hero in 2004 as the first Indian athlete to win an individual Olympic silver medal in any sport since 1900. His achievement in the double trap event (see http://en.wikipedia.org/wiki/Double_trap) in Athens paved the way for his teammates to follow, *“Rathore changed me; his silver ensured gold became my possibility. It’s what Indians need to do, feed off each other’s success”* (Bindra, 2011, p. 183).

My first visit to India was in 2001, to work with Chilly. I (first author) immediately observed his unquenchable thirst for knowledge about all things shooting. At each training session he recorded every word I said, always coming back the next day with a host of questions, *“What is the best way to clear my mind before calling for the target? Do you think I should try to be the Iceman or the Peaceful Warrior during competition? What should I do to avoid getting angry after a miss? Should I analyse my hits and misses during the round?”* We spent

many hours discussing these and other similar questions. Twice during that trip, Chilly equalled the then world record score of 194 from 200 targets in training competitions, which I think confirmed to him that he had the talent to succeed at the highest level. The following year he rose to international prominence at the 2002 Commonwealth Games by beating three Olympic champions, Australians Russell Mark and Michael Diamond and Great Britain’s Richard Faulds, to secure the individual title and, with Moraad Ali Khan, the pairs gold medal as well. He successfully defended his Commonwealth Games individual title in 2006.

I have vivid memories of Chilly during the 2004 Olympic Games in Athens. I was a member of the Great Britain team but, with all shooters bunched together in a shared changing room, I observed at close quarters how he prepared for his finest hour. He was a picture of self-sufficiency, quietly going about his business, enjoying the camaraderie of his double trap rivals but somehow remaining apart from the others, almost serene amid a maelstrom of excitement and anticipation. In the Olympic competition Chilly retained his composure to recover from a poor second round and



Credit: Courtesy of Indianshooting.com



Chilly (r) with the first author in Athens 2004

qualify for the final in 5th position, with an unspectacular score of 135 from 150 targets. In the final, Ahmad Al-Maktoum of the United Arab Emirates was the runaway winner of the gold medal but Chilly applied himself manfully to edge out Wang Zheng of China for the silver medal by a single target, finding just the right balance of calmness and aggression. His modest final score of 179 from 200 targets demonstrated the old maxim that to win medals you don't necessarily have to shoot well, just well enough.

Until recently, Chilly was a Special Forces officer in the Indian Army, incredibly fit, who carries with him an aura of calm authority. In Athens, he truly was a peaceful warrior. He appeared relatively unburdened by the expectations of others, despite the hype of the Indian media. Perhaps only he and those closest to him truly believed

that he could break the mould for an Indian shooter. Being devoid of a support team typical of other nations (e.g., coaches, physiotherapists, masseurs, fitness trainers, psychologists) perhaps made it easier for him to retain the precious simplicity and clarity of thought that is easily lost in an Olympic environment.

Chilly worked relentlessly to improve his shooting, often practising on the range long after others had gone home. I recall working with him at the 2005 World Championships in Lonato, Italy where he rehearsed his gun mount more than 1000 times an evening in his hotel room. Post-2004, he started to fiddle endlessly with his equipment, looking for innovations or adjustments that might possibly give him a slight technical edge over his competitors. I remember him fashioning a homemade grip for his gun from some strange concoction of sawdust and glue, to ensure that his trigger hand was always in precisely the same position. He then changed the shotgun that had won him the Olympic medal in favour of a high-ribbed version more akin to that used by Al-Maktoum. His search for a technical advantage did not pay off, however, and the more variables he introduced into the technical equation the more confused the situation became.



Credit: Courtesy of ISSF/Schreiber

Eventually, his driven approach and relentless work ethic saw him burned out by the time of the 2008 Olympic Games. He took the 2009 competition season off but gradually worked his way back to prominence, equalling the world record in late 2011 with a score of 148 of 150 to win the Asian Championships. Col. Rathore left the Indian Army in September 2013 to embark on a career in politics, and in May 2014 made a successful political debut by gaining election to Congress in a landslide victory.

The Indian shooting community should not despair at the loss of one of its iconic members because there may be another Rathore in the Indian team before too long. Chilly's son Manav, just 12 years old at the time of writing, is already showing a precocious talent for the sport. It will be interesting to see what his future holds for both father and son.



view video:
Chilly equals
world record



view video:
Shooting
prodigy -
Manav Aditya
Rathore

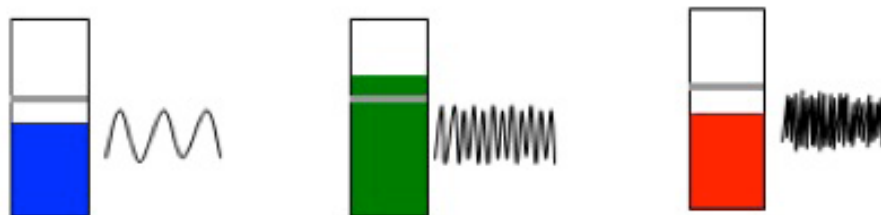
Neurofeedback Training



Credit: Courtesy of Paul Mahoney

Neurofeedback training is a process whereby real-time displays of electrical activity in the brain is fed back via electroencephalography (EEG; see <http://en.wikipedia.org/wiki/Electroencephalography>) to help individuals learn to regulate their own neural processes. When applied with shooters, a preliminary step in the neurofeedback process is to identify the EEG activity associated with best shots and worst shots (Loze, Collins, & Holmes, 2001). The next step is to devise a program of neurofeedback training for the shooter that rewards EEG activity associated with best shots and inhibits EEG activity associated with worst shots. Rewarding the shooter for achieving optimal neural activity can occur using an audio signal, a visual representation, or by progressing through a video game when the desired EEG patterns are present. Neurofeedback training has been shown to provide significant improvements in rifle shooting performance (Rostami, Sadeghi, Karami, Abadi, & Salamati, 2012) and was used extensively by Abhinav Bindra in his successful quest to become India's first Olympic shooting champion (see Case Study #3).

It should be noted that optimal neural activity for shooting varies across events and between individuals. Rifle and pistol shooters generally benefit from lower frequency EEG activity in the alpha range, representing relaxed awareness (see Figure 2), whereas slightly higher frequency neural activity in the high alpha to low beta range, appears to be advantageous for shotgun shooting, with the optimal position within this range being dependent upon individual differences (Terry & Mahoney, 2009). Research in the area of neurophysiology has identified that expert rifle shooters show "decreased involvement of cognition with motor processes" in the time period immediately preceding trigger pull (Deeny, Hillman, Janelle, & Hatfield, 2003) supporting the benefit of generating a quiet mind when shooting.



Frequency (Hz)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Frequency Range	Delta				Theta			Alpha				SMR		Beta																
Associated States	Sleep				Drowsy			Relaxed Awareness				Relaxed Focus		Intent Focus		Anxiety														

Note. SMR = sensorymotor rhythm.

Figure 2. EEG frequencies and associated arousal states.

Beijing 2008

To facilitate mental rehearsal of the Olympic competition, it is common to visit the venue some months in advance of the actual competition to make a short video of the facilities. Typically, this visit occurs during the “test event” that is scheduled as part of the ISSF World Cup series early in the same year of the Olympic Games. In the case of the Beijing Olympic Games, this event was held during April 2008, four months in advance of the Games.



view video:
Beijing Range

This test event gave all the shooters an opportunity to get a feel for the venue and the idiosyncracies of the range. The first author filmed a short video of the shotgun range, which was still under construction during the test event, to provide the shooters with an *aide-mémoire* that would make their mental rehearsal just that little bit more realistic (see Beijing Range video).



Case Study #3:

Abhinav Bindra (10 m air rifle World Champion 2006, Olympic Champion 2008)



Credit: Courtesy of Massimiliano Naldoni

To understand Abhinav Bindra's achievement in becoming the 2008 Olympic champion it is necessary to understand something of the man himself and the circumstances surrounding his journey to the very top of his sport. This case study will hopefully convey his single-mindedness and incredible attention to detail, but for greater depth of insight the reader is referred to his beautifully crafted autobiography, *A Shot at History: My Obsessive Journey to Olympic Gold* (Bindra, 2011).

By his own admission, Bindra is obsessive about every aspect of his shooting, his gun, his technique, his nutrition, his body, and his brain. His approach to preparation is a

perfect example of covering all three slices of the performance pie - skill, physical conditioning, and psychological readiness (Karageorghis & Terry, 2011) - which he integrates imaginatively into a varied range of activities.



view video:
Bindra
biography

The cornerstone of his rifle shooting art is a rock solid technique that will not break down in the emotional melting pot of Olympic competition. Bindra is obsessively meticulous and patient about honing his skill and untiring in his willingness to practice until every minute aspect of his routine is perfected and automated.

From 2001, Bindra's technique was, in his words, "*analysed, stripped down and rebuilt*" by his coaches, Gaby Buehlmann and Heinz Reinkemeier, a risky but necessary strategy if he were to become a consistently great shooter. Just changing the position of his hips from 11 o'clock to 12 o'clock to the target took three years to incorporate fully. The differential muscular tension required - no tension in the neck, minimal in the shoulders, just enough in the legs to lock the knees, relaxed feet - took endless hours for his mind and body to master. His "*exquisite muscular dance*," as he describes it, also involves an educated right trigger finger that instinctively differentiates between the 20 grams of pressure to prepare for firing and the 30 grams required to release the pellet, a right arm tense enough to hold the gun absolutely still, a relaxed left arm with a wrist that does not bend. To help master such complex muscle control, Bindra used an ultrasound machine to actually "see" the muscles as he tried to activate them.



Credit: Courtesy of Massimiliano Naldoni

Unlike many shooters, Bindra places strong emphasis on his physical fitness, regularly including twice-daily workouts in his training schedule, or testing his endurance during all-day hikes in the Bavarian Alps, or putting himself through brutal commando training just a week before the 2008 Olympics. His rationale for doing so was founded on the belief that his capacity to retain the necessary balance, clarity of mind, body awareness, and muscular control at the most critical moments of competition would be enhanced if he were in prime physical shape. Moreover, overcoming the sometimes extreme psychological challenges that were built into his physical conditioning laid the foundation for genuine belief that he

would win in Beijing. Bindra tells of the sublime moment standing atop a pole 40 feet high during commando training in Munich when he was forced to conquer his fears, trust his safety harness, and step off into thin air. This experience bolstered his self-belief hugely, *“Winning a medal, I told myself, cannot be tougher than this, it cannot be scarier”* (Bindra, 2011, p. 159).

Bindra is renowned for his willingness to try any psychological strategy that might provide even the tiniest performance enhancement. In his preparations for the Beijing Olympics, he spent many hours in a flotation tank, meditating and visualizing a successful performance at the Olympic range. He also simulated the range, which was unusually large, by renting a marriage hall in his home town of Chandigarh, and rehearsing his Olympic performance there. Similarly, he replicated the unusual dark wood panels behind the targets and the very bright lighting of the Olympic range on his range at home.



Credit: Courtesy of Tim Harkness

Perhaps his most significant mental training initiative was to travel to South Africa to work with sport psychologist Tim Harkness. Bindra completed about 150 hours of neurofeedback training, where Harkness monitored EEG, muscle tension, skin conductivity, and respiratory cycles to help Bindra learn to generate the psychophysiological state associated with his best shooting. His preparations for Beijing also involved training to shoot under pressure, coping with distractions such as flags popping up in his line of vision, rattles shaking while he shot, or Harkness shouting *“miss, miss, miss”* while he prepared.



Bindra's Olympic simulation training continued at a training camp in Munich where, in his words, he became "a method actor polishing my craft before a Broadway opening" (Bindra, 2011, p. 155). He cycled 45 minutes to the range instead of driving to replicate the time to travel from the Olympic village to the Beijing range. He rehearsed walking onto the finals range with a relaxed, open posture rather than the defensive, cross-armed posture that characterised his body language during his disastrous 2004 Olympic campaign. He regularly practised firing 10 shots in three minutes to strengthen his ability to find the required balance and mindset quickly. His coach deliberately changed the sight on his rifle to test whether he could cope with the stress of fixing it under extreme time pressure.



view video:
Bindra Gold



Credit: Courtesy of Massimiliano Naldoni

Multiple dress rehearsals of the final were conducted, with every conceivable scenario rehearsed. Most of all, the final shot in the final was simulated over and over again because it represented the precise moment when years of hard work would either culminate in glorious victory or dissolve into bitter disappointment. When that decisive moment in Beijing finally arrived, he released his victory-clinching 10.8 shot in just a few seconds, so well-rehearsed had that final shot been.

In becoming the first Indian in history to win an Olympic gold medal in any individual sport, Bindra was transformed into a role model for an entire generation of Indian shooters, one or more of whom will surely follow in his wake.

Influence of Role Models

Every successful sport system thrives on having successful role models who inspire the next generation of athletes. There is no doubt that Rajyavardhan Singh Rathore's Olympic silver medal in 2004 provided an enormous shot of self-belief for the whole of the Indian shooting community, demonstrating conclusively that Olympic success was within India's grasp. Many subsequent achievements by the Indian shooting team, notably Abhinav Bindra's 2008 gold medal in Beijing, have been attributed to a greater or lesser degree to Rathore's Olympic breakthrough.

Anjali Bhagwat, a Role Model of Success for Female Indian Shooters

Another role model for Indian shooters, especially females, rifle shooter Anjali Bhagwat has exerted a positive influence on those who followed.

Known as *Arjuna of India* (India's shining light), Bhagwat is regarded as one of the country's greatest female athletes of all time.

Ranked World #1 in 10 m air rifle (http://en.wikipedia.org/wiki/10_metre_air_rifle) during 2002, she won the 2003 World Cup Final with a world record score of 399/400. A 3-time Olympian, Bhagwat won a total of 31 gold, 23 silver, and seven bronze medals during her international career, including 12 Commonwealth Games titles. Such a record of achievement made her a potent role model of success for all Indian shooters.



Commonwealth Games 2010



The Commonwealth Games were held on Indian soil for the first time in 2010 when Delhi, the country's capital, hosted the event. Given the team's success in 2006, where India topped the medal table with 16 gold medals, expectations were high among the Indian public that this level of success would be repeated. These expectations placed additional pressure upon the Indian shooting team, which they felt acutely.

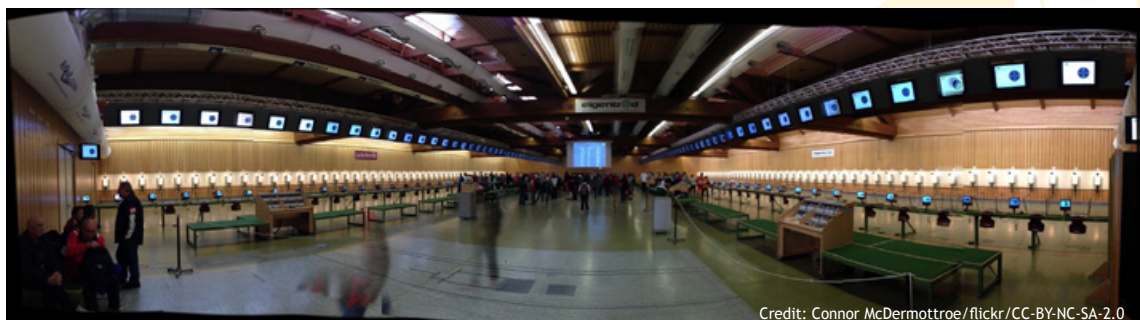
In helping to prepare some of the Indian shooters, the second author used a variety of techniques, which are summarised in Table 3.

He emphasised the potentially stressful nature of a home Games and the need to replenish emotional reserves in the month preceding the competition, using the analogy of a camel preparing for a long trip across the desert, gathering its energy before setting off. Avoiding people and situations that create stress, remaining at the shooting range only for the time required for coaching, and using relaxation sessions twice daily, were highlighted as integral elements of the competition strategy. Expending mental and physical energy during periods on the shooting range was inevitable but the goal away from the range was recovery, recovery, and more recovery. As things eventuated at the 2010 Delhi Commonwealth Games, India once again headed the medal table for shooting with 14 gold medals and 30 medals in total.



Table 3. Preparation of an Indian Shooter for the 2010 Commonwealth Games

<i>Goal: To be focused before the round (after the physical warm up):</i>
<ul style="list-style-type: none">• <i>Visualisation of your shooting action</i>• <i>Rehearse moving the gun to the target</i>• <i>Mentally rehearse your shooting rhythm while walking to the range</i>
<i>Goal: To be focused during the round</i>
<ul style="list-style-type: none">• <i>Maintain the same between-shot routine on each station</i>• <i>For example, open the gun, eject the cartridges, take one deep breath, and mentally rehearse your rhythm. Do this routine meticulously, especially for the last five targets, after a mistake, and every time you are anxious or not completely focused</i>• <i>Take a few deep breaths while walking from Station 5 to Station 1</i>
<i>Goal: To train your focus during the round</i>
<ul style="list-style-type: none">• <i>At home or elsewhere, mentally rehearse your round. Start with just the first five stations and, after a few days of daily exercise, add another five stations</i>• <i>In one month, you should be able to mentally rehearsal the whole round</i>
<i>Goal: To cope with the single-barrel final</i>
<ul style="list-style-type: none">• <i>Maintain the same shooting rhythm that you have with two shots</i>• <i>If you do not feel ready, open the gun and restart your pre-shot routine</i>
<i>Goal: To succeed at the 2010 Commonwealth Games</i>
<ul style="list-style-type: none">• <i>Spend your time only with people who create positive feelings for you</i>• <i>Stay in an environment that enables you to stay relaxed and comfortable</i>• <i>Avoid people and situations that you find stressful</i>• <i>Stay at the shooting range only for time necessary for coaching and/or competition, then leave</i>• <i>Repeat your relaxation exercises twice each day, especially during the final two weeks prior to competition</i>



Credit: Connor McDermottroe/flickr/CC-BY-NC-SA-2.0



Case Study #4:

Heena Sidhu (10 m air pistol World Cup Final 2013 Gold Medallist, world record holder)

Heena Sidhu has broken new ground for a female Indian pistol shooter by winning the gold medal at the 2013 ISSF World Cup Final in Munich, Germany and setting a world record score in the process. She only qualified for the event at the last minute because the three shooters ranked above her all withdrew for personal reasons; fate offered her an opportunity that she grasped with both hands. That win signalled the start of a run of form that saw Sidhu become the World #1



Credit: Courtesy of ISSF/DallaDea



view video:
Heena Sidhu

ranked shooter in her event, the 10 m air pistol (see http://en.wikipedia.org/wiki/10_metre_air_pistol), another first for an Indian shooter. Her rise to the top of the world rankings in early 2014 came on the back of victory in the Asian Championships and a silver medal in the first ISSF World Cup event of the season in Fort Benning, USA. Sidhu explained the delicate psychological subtleties of her event,

“In shooting, you have to concentrate on the micro movements; movements that people can’t even see and only the shooter can feel. Even a 1 mm movement on your part can land the shot in the 8th ring which really is a disaster for us. Because of these micro movements, people can’t relate to the sport, they don’t understand what is going on... they only see a shooter standing and taking a lot of time just to release that shot. Why is he taking that long, what is he trying to do, or what is going on in the shooter’s mind isn’t something that crosses the spectator’s mind” said Sidhu. “When you talk about micro movements, your focus is inwards - you are trying to control every little thing that is happening within your body. It is not outwards like it is in football where for example you have to focus on your team-mates or the opponents. We don’t have that in shooting. Shooting is all about me, myself, and my talent” (Agotra, 2014).

Sidhu is coached by the legendary Ukrainian, Anatolii Piddubnyi, former coach of the Soviet team that dominated pistol shooting in the 1980s. Like most coaches, Piddubnyi is a stickler for consistency of preparation and routine. In particular, he emphasises physical stability and muscle tone to produce a stable technique that will withstand the harshest tests of major international competitions.

“He is not one of those people who will tell you to shoot 10s and 9s. He is more bothered about how you shoot them and if you are able to repeat it again and again. You need to be consistent. How you pick up your pistol, how you come down, what is your body stability, have you fixed the muscle tone. He breaks everything down into little parts that we can monitor and he makes us work on every aspect” (Agotra, 2014).

Such attention to detail is a pre-requisite for success in pistol shooting and indeed in shooting sports generally. High quality, precise preparation has become a hallmark of the Indian system in the past decade, in no small measure due to the influence of overseas coaches and sport science specialists. Many of the international experts have been employed at considerable expense by the shooters themselves in their quest for glory, such is their commitment to excellence. This strategy has certainly paid off for Sidhu.

“Even under pressure when other people collapse... because he has trained my muscle tone so much my body doesn’t collapse. My heart may be pounding and the pressure may be building up but the muscles stay true. That is what he has taught me” (Agotra, 2014).



Credit: Courtesy of ISSF/DallaDea



Sidhu’s approach to shooting exemplifies many of the principles espoused by sport psychologists. She proclaimed that



view video:
*Sidhu becomes
World #1*

“My job is to become the best shooter that I can be, to reach my potential. If in that process I’ve become the World #1 then that’s good” (Deo, 2014).

In saying this, she expressed a clear task orientation (using self-improvement as the reference point for progress) rather than an ego orientation (focusing on victory over opponents; Roberts, Treasure, & Balague, 1998). This approach proved effective for her in securing a World Cup silver medal in Fort Benning, when her form started to waver in the final. She retained her composure by re-affirming the simplicity of the challenge via positive self-talk,

“Even if I just shoot my average it will be good enough for a medal. I told myself that and that’s what happened” (Deo, 2014).

Sidhu has adapted to the new rules of Olympic shooting, implemented in 2013, whereby finalists start on level terms rather than carrying their qualification score forward, much quicker than most of her competitors.

“(At first) I didn’t like the new rules because it was a big change overnight. You start the final round on zero points, and the whole game had changed” she acknowledged (Agotra, 2014).

Her Canadian sport psychologist, Pierre Beauchamp (see www.mindroomsp.com), encouraged her to view the change differently, *“You can either love it or hate it and rest assured 80 percent of the people are going to hate it. So if you can love it and be the 20 percent then you have already eliminated 80 percent of the competition.”*

Sidhu implemented his advice, *“So you just hypnotize yourself to like it and I did. I sort of talked to myself. And it was true, 70-80 percent of the shooters who were shooting awesome scores under the old rules ... their scores have come down a little in the qualifying rounds and a lot in the finals after the new rules came into effect. So it worked for me” (Agotra, 2014).*



Credit: Doma-W/Wikimedia Commons/CC-BY-SA-3.0

Heena Sidhu and Annu Raj Singh win gold at the 2010 Commonwealth Games

The achievements of the new breed of Indian shooter has created its own pressure in the form of expectations of future success from the Indian public and from the shooters themselves.

Sidhu acknowledges that her meteoric rise from international hopeful to World #1 in a period of just five months is an exceptional achievement, but she is aware that a different type of challenge awaits.



“At this point, I feel that I am the biggest competition to myself. Because it is not easy to perform after winning so many medals and breaking the records and being the world number 1. I know I am going to be the favourite when I go to any competition. So it is not easy living up to everyone’s expectation and your expectations too. So I think this is another sort of different challenge that I am going to face from this point on. I am not looking at anybody, I am just concentrating on what I am doing. And so far that has been good enough” (Agotra, 2014).

With her words, Sidhu encapsulates two of the most important principles in sport psychology.

The first principle, often referred to as “controlling the controllables,” involves focusing efforts on making sure that the things within your own control are done well and ignoring all those things over which you have no influence.

The second principle refers to focusing on the process of what you are attempting rather than its outcome, in the knowledge that if the process is right the outcome will take care of itself.

Whether Sidhu will be able to follow her own advice remains to be seen. Having missed out on reaching the final shootout between the top eight qualifiers at either of the ISSF World Cup events during June 2014, it is clear that it will be no easy challenge.



Credit: Cajetan Barretto/flickr/CC-BY-NC-SA-2.0



Credit: Courtesy of Ronjan Sodhi

Summary

As a source of national pride, shooting has become one of the most important sports in India. The Indian shooting team continues to thrive and the number of Indian shooters challenging for medals in international competition continues to grow. In this chapter, we have attempted to provide insights into the psychology of sports shooting and to describe the nature of the support provided for the Indian team.

Although India still has a long way to go before it becomes a powerhouse sporting nation (aside from cricket), shooting probably represents its best chance of securing future Olympic medals and establishing itself as one of the toughest nations to beat in international competition.



view video:
Sodhi wins
World Cup
Final 2011

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