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Mental Imagery-A Tool for Excellence in Sports Performance

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What is mental imagery? (The mental game plan- Stephen Bull, 4, 65)A few years ago former motor racing champion Damon Hill was seen in formula one car as his head swayed from side to side. This was not to attract the media but Hill was sitting in a stationary car waiting to exit the garage in an attempt to qualify for the race and was using the time leading up to a performance to mentally rehearse and imagine steering the correct racing line through each corner. Although imagery refers to 'seeing' in the mind's eye it is very important to point out that the most effective imagery goes beyond simply seeing a skill being performed. Well practiced imagers will incorporate the sensations of hearing, smelling, tasting, and the most important of all, smelling, tasting, and the most important of all, feeling into the sessions. The more detail that can be included in the sessions the more impact the training is likely to have. Thus imagery is a process of seeing oneself performing or practicing a sports related skill or imagining yourself competing in a certain situation. It is the reproduction in the mind of all relevant sensory information which contributes to the successful execution of a skill or correct be.

How Mental Imagery Works (The mental game plan- Stephen Bull,4,68) The reason visual imagery works lies in the fact that when you imagine yourself perform to perfection and doing precisely what you want, you are in turn physiologically creating neural patterns in your brain, just as if you had physical performed the action. These patterns are similar to small tracks engraved in the brain cells which can ultimately enable an athlete to perform physical feats by simply mentally practicing the move. Hence, mental imagery is intended to train our minds and create the neural patterns in our brain to teach our muscles to do exactly what we want them to do.

Different uses of imagery in sport-(The mental game plan- Stephen Bull,4,67)

Imagery use	Examples
Mental practice of specific performance skills.	Imaging of a back-hand volley.
Improving confidence and positive thinking.	Imaging previous successful performances.
Tactical rehearsal and problem solving.	Imaging basketball set- offences.
Controlling arousal and anxiety.	Imaging relaxing images to calm nerves.
Performance review and analysis.	Reviewing a match for strong and weak points.
Preparation for performance.	Imaging of performing well in different conditions- weather, opponents, luck, officials
Within pre performance routines	Imaging a successful conversion attempt during pre-kick preparation.
Maintaining mental freshness during injury.	Imaging golf swing when unable to physically practice.

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Fundamentals of the skill- (The mental game plan- Stephen Bull,4,84)

1- Mentally warm up before you carry out your imagery training session
2- Focus on real time imagery, using as many of the senses as possible. Try to create as realistic as possible. Try to create as realistic an image as possible.
3- Use your natural imagery perspective [internal or external] to begin with. Look to develop both perspectives in time.
4- When starting your imagery training, set yourself short sessions to be regularly carried out through the week.
5- Don't compromise the quality of sessions for quantity. I f you are losing concentration stop the session after one more quality image.
6- Once you have the basic skills, experiment with imagery to find out how it works best for you. Try it before or after physical training. After your body position for different sessions, and maybe try using video to enhance the sessions.
7- Practice imagery regularly, and don't stop once you think you are getting good. The mind is like a muscle- stop training it and it will lose its efficiency.

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The five main categories of imagery have been identified as follows:

www.brianmac.co.uk/imagery.htm

Motivational-specific (MS) – This involves seeing yourself winning an event, receiving a trophy or medal and being congratulated by other athletes. MS imagery may boost motivation and effort during training and facilitate goal-setting, but is unlikely on its own to lead directly to performance benefits;

- Motivational general-mastery (MG-M) – This is based on seeing yourself coping in difficult circumstances and mastering challenging situations. It might include maintaining a positive focus while behind, and then coming back to win. MG-M imagery appears to be important in developing expectations of success and self-confidence;
- Motivational general-arousal (MG-A) – This is imagery that reflects feelings of relaxation, stress, anxiety or arousal in relation to sports competitions. There is good evidence to suggest that MG-A imagery can influence heart rate – one index of arousal – and can be employed as a 'psych-up' strategy;
- *Cognitive* specific (CS) – This involves seeing yourself perform specific skills, such as a tennis serve, golf putt or triple-toe-loop in figure skating. If learning and performance are the desired outcomes, evidence suggests that CS imagery will be the most effective choice;
- Cognitive general (CG) – This involves images of strategy and game plans related to a competitive event. Examples could include employing a serve-and-volley strategy in tennis or a quick-break play in basketball. Case studies support the use of this type of imagery, although controlled experimental evidence is still needed.

Clearly there is potential for these types of imagery to overlap if, for example, you imagine specific sports skills, such as a golf putt (CS), with the accompanying positive outcome and tournament-clinching result (MS). However, research suggests that if you choose the wrong type

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of imagery, you may not achieve any benefits. For example, one study showed that CS imagery significantly improved sit-up performance, while MG-M imagery was ineffective. Conversely, other studies have shown MG-M imagery to be more effective than CS imagery for boosting self-confidence. The trick is to decide what it is you want to achieve, then make the imagery content match your goals. In designing imagery training programmes, follow the FITT principle (see below), which has often been associated with physical training.

Exercise: Peeling an orange (http://www.braingle.in)

Imagine you have an orange clasped in your hands. See the bright colour, feel the texture of the orange and imagine squeezing the fruit with your fingers. Now imagine peeling the orange by digging your thumb beneath the surface of the skin. Imagine your fingers and thumb working to remove the outer layer of the fruit. Feel the zestful spray as the juice begins to run onto your hand. Try to imagine the distinctive aroma. Once you have fully peeled the orange, imagine dividing it into segments before eating it. Recall the taste of the fruit as vividly as you can.

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Alternatively, you could stare at the flame of a candle – or indeed any object – for a few seconds and then try to see the image again in your mind's eye. Close your eyes and try to recreate the image as clearly as you can. Focusing on your own hands is a particularly good exercise, as you can develop further movement awareness by closing your eyes, creating a new shape with your hands and, without looking, trying to imagine how your hands look. Then open your eyes and check how close you were to the real image.

You might try using imagery after a performance, as this is a time when you tend to remember more clearly and are often most able to recall the vividness of the situation and what happened.

Studies regarding imagery

(www.vanderbilt.edu)

During the 80's and 90's, the studies conducted on mental imagery were rather inconsistent due to different confounds such as lack of subjects and reliable controls. In addition, researchers used a variety of skills because they were not exactly sure what the subjects should do when they engage in mental practice. Hence, some were more likely than others to work with mental practice which varied the results. However, now there is sufficient reliable evidence that suggests imagery rehearsal can sometimes improve motor performance in a variety of sports. Feltz and Landers conducted a meta-analytic to examine 60 studies in which mental practice was compared to control conditions. Their analysis yielded 146 effect sizes with the overall average effect size of 48 positing that mental imagery practice "influences performance more than no practice," but consistently less effective than physical practice. On average, the effect sizes were larger with the studies which used cognitive tasks. Overall, the cognitive rehearsal conditions showed a better performance, about 1/2 of a standard deviation unit.

In 1992, Anne Isaac conducted a study which examined the influence of mental practice on sports skills. While most of the previous studies on this topic showed positive effects of mental

rehearsal, they were not performed in actual field context using subjects who learned actual sport skills rather than just novel motor tasks. Isaac eliminated this problem in her experiment. She also tested the hypothesis of whether people who have better images and control over their images result in better performances. Isaac tested 78 subjects and classified them as novice or experienced trampolinists. Then she further divided the two groups into an experimental and control group. She also classified the subjects as either high or low imagers based on initial skill level. Both groups were trained in three skills over a six week period. In order to prevent confounds, the imagery group was unknown to the experimenter until afterwards. The experimental group physically practiced the skill for 2-1/2 minutes, which was then followed by 5 minutes of mental practice. Lastly, an additional 2-1/2 minutes of physical practice followed the mental practice. Meanwhile, the control group physically worked on the skill for 2-1/2 minutes, which was then followed by 5 minutes of a session trying a mental task of an abstract nature, such as math problems, puzzles, and deleting vowels. Then, 2-1/2 more minutes were spent physically working on the skill again. The outcome of the experiment was as followed: there existed a significant difference in the improvement of the high and low imagers. In both novice and experimental groups where the initial skill ability was similar, the high imagery groups showed significantly more improvement than the low imagery group. Furthermore, there was a significant difference between the experimenter and control groups. Not surprisingly, the experimental group had significantly more improvement than the control group. This study posits that despite the level of skill (beginner or experienced) visual imagery proves effective.

In a recent experiment conducted by Roure et al, they found six specific autonomic nervous system (ANS) responses that correlated with mental rehearsal, thereby improving sports performance. The subjects were placed into an imagery group and a control group. The task measured in each group was based on their ability to pass an opponent's serve to a given teammate, in the sport of volleyball. The experimenters measured the variations of the ANS during the motor skill and during the mental rehearsing sessions. The ANS parameters tested included: skin potential and resistance, skin temperature and heat clearance, instantaneous heart rate, and respiratory frequency. The results of the test revealed a strong correlation between the response in the actual physical tasks (both pre- and post-test volleyball) and during the mental imagery sessions. There existed a difference in the skills between the imagery and the control group, the former being the better. In addition, no clear difference was present between the pre- and post- tests in the control group. This study showed that mental imagery induces a specific pattern of autonomic response. These include: decreased amplitude, shorter duration and negative skin potentials when compared to the control group. As a consequence of the ANS, the imagery group was associated with better performance. In light of this experiment, Roure suggested that metal imagery may help in the construction of schema which can be reproduced, without thinking, in actual practice

Not only does mental imagery seem to enhance athletic performance, but it has been shown to enhance intrinsic motivation as well. A study in 1995 tested who would spend more time practicing a golf putting task and who would result in having higher self efficacy. Thirty nine beginner golfers were grouped into an imagery or control group. For 3 sessions, both groups were taught how to hit golf balls. The imagery group practiced in an imagery training session designed for this specific golf skill. As a result, the imagery group spent significantly more time practicing the golf putting task than the control group. In addition, the subjects in the imagery group had more realistic self-expectation, set higher goals to achieve, and adhered more to their training programs outside the experimental setting.

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Since all of the studies mentioned have focused on adult subjects, I wanted to see if mental imagery had the same effect on children. I found a study which examined the effects of mental imagery on performance enhancement with 7-10 year old children. In this experiment, table tennis players were divided into three groups. The results indicated that the children who used mental imagery had significant improvement in the accuracy and quality of their shots compared with the control group. This study shows that mental imagery training for children can be beneficial. This could be a perfect opportunity to learn mental skills at an early age which can ultimately give them greater control over their own destiny. However, this is only one particular study, and more studies on children do need to be conducted.

Conclusion

After reading through numerous studies, visual imagery seems somewhat promising and beneficial. Although it is not as beneficial as physical practice, visual imagery fairs better than no practice at all. Hence, a program with physical practice combined with mental training seems to be the best method. Virtually all of the studies show that mental training improves motor skills. More recently a lot of studies go even further and prove that visual imagery can improve various skills related to sports in actual field contexts. Visual imagery seems to be beneficial to anyone who wants to improve at their sport. Whether you are a recreational athlete or a professional does not matter. The benefits of mental imagery have proved successful at any level. So if you are a professional looking to break into the top, or a club player who simply wishes to defeat his/her friend, I recommend incorporated mental imagery along with physical practice. Not only can mental imagery improve specific motor skills but it also seems to enhance motivation, mental toughness and confidence, all which will help elevate your level of play.

However, even though most of the studies demonstrate that mental imagery results in significant sports improvement, I am skeptical to the extent of the external validity of these experiments. If one can return a serve more precisely in volleyball, does that mean that it will work under real pressure situations? In addition, does this mean that improvements will be made in other areas of the game besides the serve? Will this work in other sports not yet tested such as football? It seems rather naive to generalize these finding to real world, intense pressure situations of all sports. There also lies a shortage of evidence regarding exactly how mental imagery works to enhance performance. More studies need to be done to determine when and why imagery techniques are and are not effective. If this problem can be addressed, then more effective techniques can be created and will in turn further increase the effects of mental imagery. In addition, it might also help solidify the validity of the previous experiment.

References

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