Mental Rehearsal and Learning in Tennis

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THEORETICAL BACKGROUND

At present, mental preparation for tennis play is reserved for elite adult players and is practically non-existent for young hopefuls. Furthermore, in training, motor repetition is generally the only method used by coaches to reinforce learning. However, the majority of research in this area shows that gestural representation is a decisive tool in the learning process (Bertsch and Le Scamaf, 1995). The serve is the most closed tennis stroke and a key motor skill in winning matches. It may therefore be assumed that visualisation work for the serve may be undertaken to facilitate learning and enhance performance.

What is imagery?

Chevalier (1990) demonstrated the importance of distinguishing between the concepts of representation, imagery and mental rehearsal within the context of cognitive representation studies.

Representation refers to a form of psychological exercise about current events or situations, or through the recalling of information coded in the long-term memory. The concept of cognitive representation refers either to a process or the product of a process (Denis, 1989). If it is a process, we shall look at the nature of the representation of the movement, for example the structural properties of the motor action. If it is the product of a process, we shall be looking at the functions of the representation, the effects of using the process on acquisition and motor performance (Chevalier, Hall and Nadeau, 1990).

Three sensory exteroceptive systems are connected with the representation: kinaesthetic, auditory and visual; we can also add the proprioceptive which includes kinaesthetic and vestibular. Representations arise from each of these systems. Kinaesthetic representations are utilised during the memorisation of movements (Chevalier-Girard and Wilberg, 1980; Chevalier, Denis and Boucher, 1987). Imaging refers specifically to the process of achieving the representation of situations, objects and movements, processes likely to play a role in mental activities such as solving motor problems, memorising movements, etc.

Mental rehearsal involves the mental recall of a movement or motor pattern without its muscular production (Denis, 1989; Denis, Chevalier and Eloi, 1989). In athletic circles mental rehearsal has been utilised and it has been demonstrated that it contributes to developing an athlete’s mental image (Chevalier and Renaud, 1990, 1991), and to enhancing sports performance (Chevalier 1989; Hall and Erffomayer, 1983; Mumford and Hall, 1985; Suinn, 1983).

Contribution of imagery to mental rehearsal

Chevalier (1990) demonstrated that imagery makes a significant contribution to acquiring motor skills by using mental rehearsal procedures (Denis, Chevalier and Eloi, 1989). Three main schools of thought seek to account for this phenomenon.

The neuromuscular theories postulate that the electromyographic activity detected in the muscle groups normally involved in performing a movement, when mentally recalling that movement, are conserved and subsequently re-used in the context of actually performing the movement (Denis, Chevalier and Eloi, 1989).

Symbolic theories highlight the cognitive component of mental rehearsal. They attribute its effectiveness to the cognitive processing that accompanies this activity. Accordingly, mental rehearsal is felt to gain its effectiveness from the possibility it provides for the performer to better organise the representation of the situation, of the movement to be performed, and in particular the perceptual cues essential to performing the task (Denis, Chevalier, Eloi, 1989). In short, symbolic theories place a greater emphasis on the cognitive relationship between imagery and mental rehearsal in learning motor skills.

The third school of thought focuses largely on concentration and mental preparation factors (Feltz, Landers, 1983; Weinberg, 1982). Mental rehearsal is thought to promote concentration on the motor task and reduce the risk of the performer’s attention being diverted by exogenous or endogenous stimuli. These concentration factors can then be transferred to actual performance. The work has focused mainly on mental rehearsal of instructions, relying heavily on imagery.

Effect of mental rehearsal in the operational context

Field research has measured the effectiveness of mental practice. The more interesting studies are on athletes who compete regularly, with most of them associating a technique of relaxation with mental imagery, similar to the model of “visuomotor behaviour rehearsal” (VMBR) by Suinn (1983). The general results of these studies clearly demonstrate the relationship between these techniques and the enhancement of sports performance. In general, activities such as relaxation and cognitive restructuring are effective for individual sports. Furthermore, in the studies on athletes performing under pressure (in direct competition with others), cognitive-behavioural training techniques enhanced performance significantly. With regard to the types of performance measurement, results are more significant for measurable performance levels than for performances based on marks by judges. With regard to the types of skills, marked by Whealan et al. (1989), results are more significant for precision, strength and endurance tasks than for speed and balance tasks. These effects are typical for beginners but greater for experts.

When the use of imagery and learning strategies is effective

Chevalier (1990) defines the circumstances when effectiveness can be achieved in the use of imagery. Referring to several studies carried out in this area, she suggests seven conditions should be met to achieve the effective use of imagery and mental rehearsal.

Levels of familiarisation: it seems that the level of practical experience is a dependent variable in the ability to make use of imagery. Therefore, if mental rehearsal is used when the subject has not acquired sufficient experience of the task, negative effects may appear, particularly if the subject has constructed an incorrect representation of the skill to be acquired (Johnson, 1982). In other words, mental rehearsal depends on a minimum level of familiarisation with the task to be acquired and, in the cognitive phase of learning, enables a representation of it to be consolidated.

Nature of the task: the most noteworthy effects of the use of mental rehearsal are achieved in tasks where the cognitive component is substantial (task involving a high level of visual activity and requiring fine visuomotor adjustments).
Similarities between practice and image representation: the adequacy and similarity of the mental image called up during mental rehearsal with respect to the skill to be acquired are important conditions to be observed in the practice and learning of motor tasks.

Motivation: imagery is found to provide a motivational function in acquiring motor skills (Paivio, 1985; Hall, Toewes, Rodgers, 1990).

Cognitive style: imagery training has reduced the visual imagery skill level of verbally predominant subjects, suggesting that for subjects who refer spontaneously to verbal information coding, any orientation towards the visual components of the image would be of little use in their learning process.

Vividness of Image: it seems that the degree of activation of the image estimated from its vividness as declared by the subject is an important factor in the functional effectiveness of the image in a mental rehearsal procedure (Denis, 1987). Subjects classified as highly imaginative on the basis of VVIQ results (Marks, 1973) demonstrated greater accuracy in location tasks than subjects with a low level of imagination (Hall and Goss, 1985).

Degree of maturity, children’s mental image: it appears that a child over ten years of age can benefit from the mental image in a mental rehearsal activity, but is unable to develop an effective functional representation of a motor task.

Combining mental practice with physical on-court practice? The following assumption was formulated: if combined training contained a greater share of physical practice, 70% compared to 30% of mental rehearsal, the results would be better than with physical practice alone. Hird and his colleagues (1982) attempted to answer this question. The results showed that all the processing conditions increased the performance of the pre or post test, except for the cognitive task control group. The conclusion of this study was: if enhancing performance is the only variable to take into account, replacing physical practice by mental practice would not be effective.

However, in conditions where physical practice might be costly and take time in the event of fatigue or injury, mental rehearsal combined with physical practice or mental rehearsal alone was more effective.

OBJECTIVES OF THE STUDY
The objective of the study was to describe how young tennis players can effectively adjust the representation of the serve (acquired by visualisation training) according to the game context during the match.

In order to achieve our research objective, we experimented with an original performance preparation methodology as part of establishing a year-long training programme for young regional hopefuls. Two questions guided our research. The first focused on the methodology of mental rehearsal and was expressed in the following manner: how could one encourage the creation of mental images of the service motion that were easily adaptable in action for very young players? The second question focused on the use of such images during tennis play and was expressed: how and when does a young tennis player use the representation of the service motion created by imagery during match play?

METHODOLOGY
The participants in the study were three young tennis hopefuls in Brittany (2 boys and a girl) born in 1995. They were being coached in a training centre (specialised in producing high level tennis players) and had four training sessions per week (2 in the club and 2 at the centre).

Training at the centre included 30% mental preparation and 70% physical practice. A programme of mental preparation was implemented which involved the Jacobson relaxation method in an isolated environment in the dark, and then visualisation of the service motion followed by use of the training video.

Training sessions were filmed, as well as certain matches, and specific technical work was proposed to players. It was based on the use of self-analysis sessions (player talking through videos of their action during training and in matches) as a tool for verbalising and mobilising representations during tennis play and for improving performance.

RESULTS
The effectiveness of mental rehearsal was highlighted during self-analysis sessions with players making use of videos filmed during training and in matches. The coach also observed an effect of such training in the form of swifter tactical and technical learning compared to players in the group not taking part in the mental rehearsal programme.

Results showed that the methodology proposed gradually favours the understanding of the tactical aspects of the game. Indeed, for our young players and in the context of training serve technique, mental rehearsal creates greater awareness of one’s body which allows them to more easily pinpoint what they must focus on from a sensorial and proprioceptive viewpoint. As far as tactical training for matches is concerned, imagery makes it possible to create more spontaneous and longer tactical plans in terms of the number of stages.

In a match situation, the use of visualisation during the season became a way in which to concentrate when serving. Indeed, during the last matches of the season, these young players systematically made use of visualisation techniques so as to better concentrate and make tactical choices before serving. During difficult moments (when they were behind), they said that they also relied on visualisation so as to better manage difficult situations.

Finally, the work of representing one’s serve is conducive to preparing point construction in a more specific manner. Such point construction hinges on better anticipation of the return of serve and thus enables the player to envisage various options for his second shot. It has been observed that representation at the beginning of the season only covers the service but gradually “opens up” to include the various possible returns of serve at the end of the season.

BIBLIOGRAPHY


