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► To cite this version:

Laurent Dominique, Nicolas Robin. A routine combining motivational self-talk and mental imagery improves service performance. ITF Coaching and sport science review, 2024, 33 (92), pp.10-13. 10.52383/itfcoaching.v33i92.462 . hal-04570763

HAL Id: hal-04570763

<https://hal.science/hal-04570763>

Submitted on 22 May 2024

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A routine combining motivational self-talk and mental imagery improves service performance

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ABSTRACT

The aim of this study was to test the effects on the performance of experienced tennis players of a service pre-performance routine consisting of internal motivational discourse combined with mental imagery centred on the trajectory of the ball and the target zone to be reached in the service box. Twenty-seven male players ($M = 17.5$ years) from the second series (ranked between 5/6 and 3/6), who had been playing tennis for more than 10 years, volunteered to take part in this experiment. The participants were divided into 3 groups (control, discourse, and discourse + imagery) and carried out 3 phases: Pre-test (20 serves in playing condition), Acquisition: 16 sessions (warm-up + 20 serves + super tie-break), Post-test (20 serves in playing condition). The percentage of success, speed and efficiency of the serves were measured at the Pre- and Post-tests and served as dependent variables for statistical analyses (repeated measures ANOVAS). The results of this study show a further improvement in serve performance when internal motivational discourse is combined with mental imagery. We recommend that experienced tennis coaches and players use internal self-talk as well as imagery in their pre-serve performance routines.

Key words: tennis, service, mental simulation, internal discourse.

Received: 5 July 2023

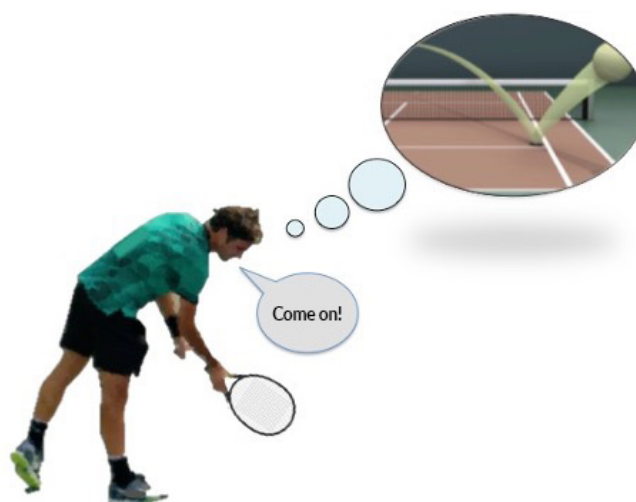
Accepted: 8 December 2023

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INTRODUCTION

Coaches and athletes recognise the value of using mental strategies, such as internal discourse and mental imagery, to improve performance in racquet sports (Cece et al., 2020; Crespo, Reid & Quinn, 2006; Robin et al., 2023). According to Latinjak et al. (2019), internal discourse refers to externalized or internalized verbalizations that tennis players address to themselves. These verbalisations can be spontaneous (uncontrolled) or strategic (linked to a predetermined objective) as mentioned by Van Raalte et al. (2016). Strategic internal discourse is a deliberate mental technique frequently used by practitioners to optimise performance by means of its cognitive function, which is generally technique-oriented (e.g., "Straighten your arm", "Bend your legs", "I have to finish my gesture") and which will help guide the execution of movements in beginners (Boudreault et al., 2016). Internal discourse can also be used to regulate the emotions of more experienced players through its motivational function (Fristch et al., 2020). For example, internal motivational discourse can be used to pro-actively or reactively regulate emotions (e.g., "Enjoy playing"), motivation ("Go ahead", "You can beat him") or effort ("I'm going to keep up", "I'm going to win the next set"), which is why it is so useful in training and especially in competition (Grammatika et al., 2008).

Other authors such as Robin and Dominique (2022) have recently shown that tennis players also frequently use other strategies such as mental imagery, which consists of mentally simulating a motor action, such as serving, to improve performance. This mental technique can be integrated into motor performance routines (Dominique et al., 2021; Le Scanff, 1999) to shift players' attention to elements other



than movement technique, such as the trajectory of the ball (Guillot et al., 2013), and make it easier to trigger movements under conditions that are as standardised as possible, hence its usefulness for serving (Dominique, 2005). Numerous studies have shown the positive effects of mental imagery as a complement to the actual execution of motor actions in racket sports (Cece et al., 2020) and particularly in tennis (Robin & Dominique, 2022). In addition, other authors have suggested that there would be additional beneficial effects if mental imagery were combined with other mental strategies such as internal self-talk (Dohme et al., 2020; Mamassis & Doganis, 2004) and if they were integrated into pre-performance routines constructed during training and used in competition (Robin et al., 2023).

The aim of this study was to evaluate the potentially beneficial effects of a service pre-performance routine consisting of internal motivational discourse combined with mental imagery (based on the trajectory and target to be reached) on the performance of first service balls in match situations. We began by hypothesising that the players who benefited from the internal motivational discourse would perform better than the players in the control group. Secondly, even better performance should be obtained by players using the combination of internal discourse and mental imagery before serving.

METHOD

27 male tennis players (Mage = 17.5 ± 1.6 years), second series (French rankings between 5/6 and 3/6 corresponding to the US 5.0 ranking), volunteered to take part in this experiment. They had been playing tennis for more than 10 years and regularly took part in regional competitions in Réunion and national competitions in mainland France. The participants were randomly divided into 3 experimental groups (control, self-talk, and self-talk + imagery). All the players completed the movement imagery questionnaire (MIQ-3f, Robin et al., 2020) to check that none of them had difficulty with mental imagery. The MIQ-3f differentiates imagery abilities for the internal visual, external visual and proprioceptive modalities. It consists of 12 items (4 per type of imagery), involving the actual execution of simple movements of the arms, legs and whole body, followed by mental imagery of these same movements. The internal visual, external visual and proprioceptive imagery capacities of each item, performed and then mentally simulated, were assessed using 7-point

Likert scales (ranging from 1 "very difficult to imagine or feel" to 7 "very easy to imagine or feel"). The experiment, approved by the ethics committee of the ACTES laboratory at the Université des Antilles, was conducted in accordance with the latest version of the Declaration of Helsinki.

PROCEDURE

After the consent form had been signed by the adult players, or their legal representatives in the case of minors, the participants completed the MIQ-3f questionnaire (Robin et al., 2020), then took part in 3 experimental phases (see Figure 1) on outdoor hard courts at the "Team Run Elite" of the Tennis Club Dyonisien de la Réunion.

The first phase, or Pre-Test, consisted of all the tennis players performing 20 serves in match conditions (super tie-break) with new balls (Head Tour XT). The second, or Acquisition phase, consisted of 16 sessions, with 2 sessions per week. Each session, lasting 40-45 minutes, consisted of a standardised 20-minute warm-up followed by 20 serves under match conditions with new balls lasting around 20 minutes. The players in the control group were instructed to perform the serves only physically. Participants in the discourse group were asked to use a positive motivational phrase (e.g., "I'm going to succeed", "Go ahead", "You can do it", "Serve well and win the point") before completing each serve. Finally, the players in the self-talk + imagery group were asked to imagine themselves using an external visual modality (i.e., seeing themselves in the third person as if they were being filmed with a camera) making a successful serve by visualising the trajectory of the ball and the target zone they wanted to reach in the opponent's service box (for a similar procedure, see Dominique et al., 2021), while using the motivational self-talk. The last phase, or Post-test, was like the Pre-test and was also carried out with new balls (Head Tour XT).

The participants' performances during the pre- and post-tests were filmed with two cameras (Canon HD Legria HF G25, Tokyo, Japan). The two cameras were positioned respectively on the right and left of the baseline, 4 m from the doubles touchline (for a similar procedure see Robin et al., 2022). The percentage of success (i.e. bounce of the service ball in the target square), the speed of the service ball (measured with an SR 3600 radar gun) and the efficiency of the services (scores ranging from "0" for a ball in the net to "5" for an ace, assessed by two BEES1 and DESJEPS Tennis experts) were

	Week 1	Weeks 2 to 8 : 2 session per week	Week 9
Consent form MIQ-3f Questionnaire	Pre-test 20 services performed in match condition (super tie-break)	Control group Standardized warm up + 20 services performed in match condition	Post-test 20 services performed in match condition (super tie-break)
		Self-talk group Standardized warm up + Motivational sentence before each 20 services performed in match condition	
		Self-talk+Imagery group Standardized warm up + Motor imagery + Motivational sentence before each 20 services performed in match condition	

Figure 1. Experimental sequence.

measured in the Pre- and Post-tests. The experts carried out the assessments independently and then met to reach a consensus on the rare cases of non-similarity (only 2% of the efficiency scores of the services concerned). After checking their normality (Kolmogorov-Smirnov test), the dependent variables were subjected to repeated-measures ANOVAS. Post-hoc analyses were performed using the Newman-Keuls test and an alpha threshold of .05 was used.

RESULTS

None of the players, and in particular the participants in the self-talk + imagery group, had any difficulty with mental imagery (all mean scores on the MIQ-3f were above 3.7/7; Robin & Blandin, 2021).

The ANOVA carried out on the speeds of the first service balls showed no significant difference between the performances of the control ($M = 154.5$ km/h), self-talk ($M = 156.3$ km/h) and self-talk + imagery ($M = 157.1$ km/h) groups between pre-test and post-test and between the experimental groups at post-test (all $p > .05$).

The statistical analysis carried out on the service success percentages showed that only the self-talk and self-talk + imagery groups improved their first serve success percentages, by 8% and 12% respectively, between the pre-test and the post-test (all $p < .05$) whereas those of the players in the control group were not statistically different between the tests (45% in the pre-test and 48% in the post-test as shown in Figure 2). In addition, players in the self-talk + imagery group obtained a better percentage of success ($M = 59\%$) than participants in the self-talk group ($M = 54\%$) and those in the control group ($M = 48\%$), at the post-test (all $p < .05$).

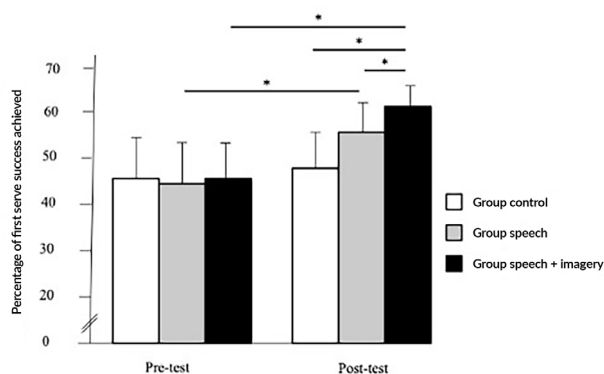


Figure 2. Percentage of first serve success achieved by players in the experimental groups (control, self-talk, self-talk + imagery), in the pre-test and post-test (* $p < .05$).

The analysis carried out on the effectiveness scores of the services revealed that only the self-talk and self-talk + imagery groups significantly improved their performance (all $p < .05$) between the pre-test ($M = 2.23$; $M = 2.24$) and the post-test ($M = 2.71$; $M = 2.73$ respectively), whereas the average effectiveness score of the players in the control group remained stable ($p > .05$) as shown in Figure 3. In addition, players in the self-talk and self-talk + imagery groups obtained better scores ($M = 2.71$ and $M = 2.73$ respectively) than those in the control group ($M = 1.98$), at Post-test (all $p < .05$).

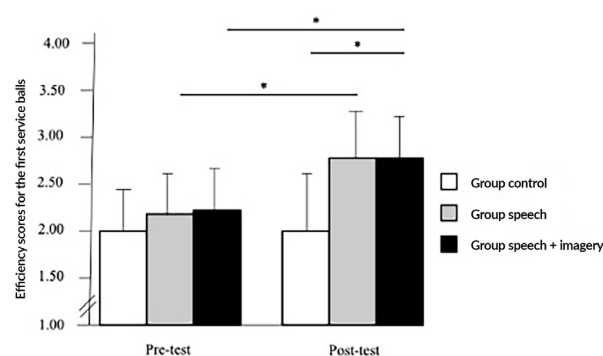


Figure 3. Efficiency scores for the first service balls, calculated on the basis of pre-test and post-test performance, for the experimental groups (control, self-talk, self-talk + imagery) (* $p < .05$).

DISCUSSION

The aim of this study was to evaluate the effects of a service routine involving a combination of internal motivational discourse and mental imagery on the first serve performance of experienced tennis players.

Initially, the results of this study show a beneficial effect of positive motivational internal discourse on the percentage of successful first service balls, whereas that of players in the control group remained stable. These results, which validate our first hypothesis, also confirm the results of previous studies that have shown beneficial effects of internal discourse on sports performance (Boudreault et al., 2016; Theodorakis et al., 2000), particularly in tennis (Fristch et al., 2020; Robin et al., 2022). As mentioned by Landin and Hebert (1999), we could envisage that positive motivational internal discourse would increase players' self-confidence, which would enable them to increase their percentage of successful first service balls. Although the use of internal discourse with a positive valence is recommended (Zourbanos et al., 2006), negative discourse could be beneficial to the performance of certain players, at certain moments in the match, because it would allow them to release tension (Van Raalte et al., 2000). We therefore recommend that coaches and trainers work with the players to determine which expressions should be used as internal discourse.

Secondly, the results of our experiment show that the tennis players who used motivational internal discourse combined with mental imagery not only had higher service efficiency scores than the players in the control group, but also obtained a higher percentage of successful first service balls than the participants in the control group and the motivational internal discourse group. These results, which validate our second hypothesis, confirm the value of combining mental techniques in tennis (Dohme et al., 2019; Robin et al., 2021; 2022; 2023), particularly when they are integrated into pre-performance routines (Dominique et al., 2021). As mentioned by Hardy (2006), it is possible that internal motivational discourse, used in combination with mental imagery, would increase tennis players' self-confidence. In addition, we could also envisage that the positive phrases used by players accompanying the simulation of a good serve, in their heads, would give them an advantage during matches by increasing their feeling of self-efficacy (Chang et al., 2014). Further research will soon be carried out in our laboratory to test this hypothesis.

It is important to stress that this study is not without its limitations. In fact, the pre- and post-tests were carried out under training conditions and not in an official match; this is why further research is needed to test the effects of imagery and/or internal self-talk in a real competition situation. In addition, the fact that the speeds of the first balls measured were relatively low (around 150 km/h) may lead us to question the degree of accuracy of the radar gun, which was nevertheless one kilometre per hour, but also the degree of expertise of the participants in this study. It would therefore be appropriate to carry out similar research with players on professional circuits.

CONCLUSION

The results of this experiment, carried out with experienced players, show a further improvement in first serve performance when motivational internal self-talk is combined with motor imagery. We recommend that experienced tennis coaches and players use internal discourse combined with mental imagery in their pre-performance routines on the serve, first in training and then in matches. To optimise the effects of these techniques, we suggest on the one hand developing the players' imagery skills by gradually integrating mental imagery into training sessions and on the other hand determining individually the expressions to be used as internal discourse. From a research perspective, we suggest directing attention towards the players' preferred imagery modalities (i.e. internal visual, external visual or kinaesthetic, or even a combination of several of them) that would be used during mental simulations of the services.

CONFLICT OF INTEREST AND FINANCING

We have no conflicts of interest to declare and this study was not funded.

ACKNOWLEDGEMENTS

We would like to thank all the tennis players who agreed to take part in this study.

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