

PRÁCTICA PROFESIONAL

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An intervention to enhance the performance of a 3000 metre steeplechase athlete with the use of segmentation and self-talk

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AN INTERVENTION TO ENHANCE THE PERFORMANCE OF A 3000 METRE STEEPLECHASE ATHLETE, USING SEGMENTATION AND SELF-TALK

KEYWORDS: Performance enhancement, Steeplechase, Segmentation, Self-talk

ABSTRACT: An intervention was carried out with an aerobic endurance athlete in order to enhance his performance in the fourth segment of the 3000 metre steeplechase race. The three-phase intervention consisted of implementing segmentation and instructional self-talk strategies. Results of the second biomechanics video-analysis showed a substantial increase in the athlete's performance in the 4th segment ($t = 1.21$ seconds). The manipulation check protocol showed a high usage of self-talk (85.8% in the first 3 segments; 100% in the fourth segment). It is concluded that self-talk can mediate cognitive processes in order to enhance aerobic endurance.

The sport psychology literature has typically addressed the cognitive strategies used by endurance athletes mainly based on the dichotomy associative/disociative cognitive strategies (Gonzalez-Suarez, 1996; Jaenes and Caracuel, 2005; Morgan and Pollock, 1977; Stevinson and Biddle, 1999; Tenenbaum, 2001). There is sufficient body of knowledge indicating the benefits of associative cognitive strategies for performance enhancement purposes in running events (Heffner, 2006; Masters and Lambert, 1989; Silva and Appelbaum, 1989; Schomer, 1986), rowing (Connolly and Janelle, 2003), or cycling (Kress and Statler, 2007). Contemporary research, however, focuses on the multidimensionality of this phenomena (Díaz-Ocejo, Mora-Mérida and Chapado, 2009; Stanley, Pargman and Tenenbaum, 2007; Tenenbaum and Hutchinson, 2007). In this regard, Buman, Omli, Giacobbi and Brewer (2008) suggest that endurance athletes use a variety of strategies in order to manage perceived effort, Hutchinson and Tenenbaum (2006) conclude that affect and motivation play a relevant role in order to cope with perceived effort, and Hall, Ekkekakis and Petruzzello (2005) defend self-efficacy and perceived competence as predictors for coping with the demands of aerobic endurance.

Despite the reasonable amount of research carried out to clarify how endurance athletes manage perceived effort, little research has been conducted in terms of strategic decision making during aerobic endurance events. It appears that coping with perceived effort is crucial for achieving success in aerobic endurance, although it is known that the best results also depend on an appropriate planning and decision making during the race. Rushall (1996) stated that if an event is of long duration, it needs to be broken into segments. Those partitions or segments should be

short enough for the athlete to totally concentrate on what needs to be thought of and done in that period. He referred to 'segmentation' as a strategy to focus on the completion of successful competition elements. According to Rushall (1996), segmenting originates from two sources: First, following the goal-setting literature, distant goals have less effect on performance than do more proximal goals, while short-term performance goals that focus on the processes needed for successful behavior enhance performance. Second, individuals faced with extensive tasks usually break them down into more manageable segments (Heads, 1989). Hence, segmentation is a recommended procedure for performance strategy construction (Manges, 1990).

Studies using various research designs and tasks have also provided support for the notion that self-talk can be an effective cognitive strategy for performance enhancement (Hamilton, Scott and McDougall, 2007; Hardy, Gammage and Hall, 2001; Zervas, Stavrou, and Psychountaki, 2007). The relevance of researching the functions through which self-statements affect behavioral processes was first highlighted by Meichenbaum (1977). In his self-instructional approach to cognitive-behavior modification, he suggested that self-statements of a particular sort followed an individual's particular behaviour (Hatzigeorgiadis, Zourbanos, Goltsios and Theodorakis, 2008). Hardy, Gammage and Hall (2001) qualitatively examined the reasons for which athletes talk to themselves. They identified two broad dimensions of self-talk functions, motivational and cognitive. The motivational dimension refers to functions such as psyching-up, increasing self-confidence, and regulating anxiety, whereas the cognitive dimension refers to functions such as the execution of skills and the development of strategies. More recently, and based on such

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— Fecha de recepción: 6 de Junio de 2011. Fecha de aceptación: 21 de Mayo de 2012.

conceptualisation, Zervas et al. (2007) have described the function of instructional self-talk as a means through which athletes provide directions to themselves. Moreover, Theodorakis, Hatzegeorgiadis and Chroni (2008) have suggested that self-talk can serve to enhance attentional focus, increase confidence, regulate effort, control cognitive and emotional reactions, and trigger automatic execution. Most research on instructional and motivational self-talk supports the notion that they serve different functions (Hatzegeorgiadis, Theodorakis and Zourbanos, 2004; Hatzegeorgiadis, 2006; Hatzegeorgiadis, Zourbanos and Theodorakis, 2007). However, their research has mainly focused on precision and power tasks. As such, the benefits of self-talk as a cognitive strategy for self-regulation and decision making purposes in aerobic endurance are yet to be addressed.

Díaz-Ocejo and Mora-Mérida (2010) investigated the effects of the perception of pacing as a regulatory strategy with aerobic endurance athletes. Their focus was to increase the awareness of the specific pace required for completing a pedaling task. Nine sub-elite middle and long distance runners underwent an intervention targeting an internal-narrow focus of attention (Nideffer, 1976), bodily/kinesthetic perception, and a dual automatic-controlled attention task. Based on previous experiences (Hamilton et al., 2007) assisted instructional self-talk (the researcher reminded self-talk cues to the participant while performing the task) was introduced on each of the educational phases of the intervention. Results showed an increase in the synchrony in pedaling on an ergo bike in the aerobic endurance athletes. The ultimate goal of the intervention was to enhance the automatic –perceptual– processing of the pace, leaving the controlled cognitive processing for strategic thinking during the race.

Given the recent trend of research acknowledging the multidimensionality and pool of cognitive strategies for aerobic endurance enhancement and regulation, we further investigated the phenomenon using a combination of segmentation and self-talk. An intervention was carried out with an aerobic endurance athlete in order to enhance his performance in the 3000 metres steeplechase. More specifically, the objective was to enhance the athlete's performance on the fourth segment of the track on each lap in the 3000metres steeplechase event (the last 100 metres of the athletic's track before the finish line). Based on previous evidence (Rushall, 1996), segmentation was considered as a strategy to focus on the completion of performance elements. This would allow a better control of the performance on each of the segments during the race. In addition, assisted instructional self-talk and instructional self-talk were used as a cognitive strategy to promote effort regulation, development of strategies and to trigger automatic execution.

Method

Participants

The intervention took place at ASPIRE Academy for Sports Excellence, based in Doha, Qatar. In the Academy, 200 student-athletes aged between 12 and 19 enrolled in different sports are provided with state-of-the-art training facilities, and a boarding school. A team of sports medicine and sports science experts supports the coaching staff. The 3000 metres steeplechase athlete ('C' from this point onwards), 19 years old and Sudanese, has been training in the Academy for 6 years. C has competed at international level, and him and his coach set as a goal for the

2010 season to achieve the standard for the World Junior Athletics Championships, held in Canada in July 2010.

Materials

For the purpose of this intervention, two record sheets were used as a manipulation check protocol. Each of them containing a 10-point scale from 1 (not at all) to 10 (all the time). The times were video-analysed by a senior biomechanist from a video recording with Panning camera on the stands in the middle of the back straight at the track, on April 13th and on April 27th. One of the methodological shortcomings in the cognitive strategies literature overall, and in the self-talk research domain more specifically, lies in the assessment of the athlete's inner cognitions (Brinthaup, Hein and Cramer, 2009). From an emic approach, the instruments available have mainly been constructed based on anglo-saxon/European populations and norms. In order to overcome such limitations, the sport psychologist used a manipulation check protocol similar to the one put forward by Hatzegeorgiadis et al. (2008). Upon completion of each training heat, C was required to indicate how frequently he had used the instructed self-talk cue on a 10-point scale, from 1 (not at all) to 10 (all the time). Two scales were used; one for the instructional self-talk on the first 3 segments of the track ('control' cue, sessions 1 to 6), and another one for the assisted/self-regulated instructional self-talk on the 4th segment ('now' cue, sessions 3 to 6). Sessions 1 through 5 were recorded by the sport psychologist, while session 6 was recorded by C himself.

Design and procedure

The sport psychologist was approached by the team's biomechanist, who expressed his concern on C's last performance after video-analysing the race on April 13th (first video-recording). The biomechanist observed consistent slower times (mean = 19''51) in segment 4 of the track (the last 100 metres before the finish line), than in the other 3 segments which complete the track (mean = 18''59 in segment 1; mean = 19''16 in segment 2; mean = 18''94 in segment 3) (Annex 1). The final time of the race was 9'46'', while C's personal best was 9'32''.

C had previous experience in Psychological Skills Training (PST). He had taken different psychomotor tests and had also had positive previous experiences in applied sport psychology work at ASPIRE (i.e. development of mental toughness). Such precedents made possible to meet directly with the coach and C to discuss his performance. C reported not knowing why his pace was slower on segment 4, and it was agreed that the sport psychologist would intervene to address the problem. C was briefed on the purpose of the intervention and was requested to sign a consent form. Additionally, permission to conduct the study was obtained by the institution's research ethics committee.

Due to time constraints before the next race on April 27th (date of the second video-recording), the intervention was designed immediately. The intervention consisted of three phases, and each session during each phase coincided with C's track training sessions. It is worth to note that the fact that C had already been introduced to self-talk and knew the target split times of the race (and of each training heat on the track) made the intervention feasible in such a short period of time. In order to ensure the desired effect of the self-talk to be used by C, the self-talk instruction cues were self-generated by the athlete, and used in his native Arabic language during the intervention (translated into English in this paper).

Phase one consisted of the introduction and implementation of segmentation to C. Session one was preceded by a brief education phase, after which C should become consciously aware of the presence of 4 cones displayed on the track (beside lane one and for the intervention purposes), visually signaling the finish/start of a new segment. One cone was placed at the start line of the track, one at the end of the first curve (100m), and another one at the 200m mark. These 3 cones were blue. The last cone (red one), was placed at the 300m mark (end of second curve, and beginning of the last straight line of the track). Session two was preceded by an education phase in which C was instructed to fixate his gaze on the next cone (immediately) after completing the previous segment. External-narrow focus of attention (Nideffer, 1976) was suggested for gaze fixation/reference point for this purpose. Each new segment and the split time checks would trigger a new goal in order to organize C's behavior and remain engaged on the task at hand. Instructional self talk on each of the three segments (cue word 'control') targeted automatic execution (upon passing by the cone).

Phase two consisted of the introduction and implementation of assisted self-instructional self-talk. In session 3, C was instructed to proceed as in session 2 of phase one, but to also implement the specific cue word for segment 4 (now). The sport psychologist was physically present on the spot, verbalizing out loud the cue just when C passed by the cone on segment 4. Similarly to previous work (Hamilton et al. 2007, with the use of an audio-

tape), this implementation was deemed appropriate due to the fact that most training heats require high intensity effort, and so the athlete may not be able to cope with the perceived effort plus an additional cognitive task. As a result of the intensity of the training heats, automatic processing may take over impairing the endurance athlete's ability to control his cognitions. Given the fact that C was instructed to consciously implement the self-talk strategy, cognitive processing was required during this acquisition phase. Session 4 followed the same protocol as session 3, although the sport psychologist would just be physically present on the spot (4th cone). His presence should serve as a reminder for C to self-generate the instructional cue. This phase focused on the strategic decision C made in order to decide which part of the race deserves more attention. It should be noted that this kind of protocol is an example for when an athlete is running to achieve a personal best/controlling his own performance. It stems from the coach's and C's main goal for the season, which was to qualify for the World Junior Championships (which requires C's personal best). Uncertainty in real competition is not taken into consideration here.

Phase three aimed at practicing the strategies implemented (segmentation and self-regulated instructional self-talk). The cones were removed, and the sport psychologist was only present as an spectator during session 5, and was not present at all in session 6. Self-reliance is targeted in this manner for C. Table 1 shows the deployment of each phase, strategies implemented and dates.

	Date	Description	Objective
PHASE 1 Segmentation	Session 1 Thursday 15	1 cone dividing each segment (different colour for the 4 th segment).	Visually differentiate between cones. Awareness. Goal-setting.
	Session 2 Saturday 17	Split-time checks on each segment + focus on the 4 th segment (cone). Instructional self-talk on 3 first segments (cue = control).	Gaze fixation on next cone, check split-time. Awareness on 4 th segment. Goal-setting. Trigger automatic execution.
PHASE 2 Assisted instructional self-talk	Session 3 Sunday 18	Same as in session 2 + assisted self-talk by the sport psychologist (SP) (cue = Now) on 4 th segment.	Implementation of instruction cue on 4 th segment. Strategic planning.
	Session 4 Tuesday 20	Same as in session 2 + Only the cone on 4 th segment + just physical presence of SP.	Split-times check + instruction cue on 4 th segment. Strategic planning.
PHASE 3 Self-regulated instructional self-talk	Session 5 Thursday 22	No cones + Split-time checks + instruction cue on 4 th segment + no presence of SP on the 4 th segment.	Self-regulated instructions/cues. Strategic planning.
	Session 6 Sunday 25	No cones + Split-time checks + instruction cue on 4 th segment + no presence of SP at all during training.	Self-regulated instructions/cues. Strategic planning.

Table 1. Summary of the intervention protocol with segmentation and self-regulated instructional self-talk for C.

Results

Results from the manipulation check protocol record sheets showed a self-talk usage of 85.8% in the first three segments during the intervention, and 100% usage on the fourth segment (Table 2).

Results from the second video-analysis on April 27th showed a substantial decrease in the mean split times on the 4th segment. A lower mean time was observed in the second video-analysis in April 27th (mean = 18''30) than in the than first video-analysis recording on April 13th (mean = 19''51) (Table 3). The difference

between the means in the 4th segment was therefore 1.21 seconds (table 3). This difference between the means on the 4th segment was more substantial than the differences of the means found in the other three segments (segment 1: 0.40 seconds; segment 2: 0.46 seconds; segment 3: 0.55 seconds, table 3). Similarly, faster split times were recorded for the fastest/upper threshold 4th segment ($t = 16''83$) on the first video-analysis, and ($t = 18''40$) on the second video-analysis. Moreover, faster times were recorded for the slowest/lower threshold on the 4th segment ($t = 20''40$) on the first video-analysis, and ($t = 19''37$) on the second video-analysis.

Session	Number of training heats on track	% ST usage 'control'	% ST usage 'now'
1	5	80.00%	
2	8	70.00%	
3	12	93.00%	100.00%
4	4	98.00%	100.00%
5	5	83.00%	100.00%
6	4	91.00%	100.00%
		Average = 85.8%	Average = 100%

Table 2. % of self-talk (ST) usage recorded on the manipulation check protocol record sheets.

Comparison of segment times			
Segment	Mean times 1 st video-analysis-analysis	Mean times 2 nd video-analysis-analysis	Difference in seconds
1	18''59	18''19	0.40secs
2	19''16	18''70	0.46secs
3	18''94	18''39	0.55secs
4	19''51	18''30	1.21secs

Table 3. Comparison of the mean times (in seconds) on each segment between the first and the second video-analysis.

The total performance time also showed a decrease in the second race (9'46'' on April 13th; 9'24'' on April 27th). This time represented a personal best for the athlete in the 3000 metres steeplechase. Yet, as shown in table 3, the biggest mean time difference took place during the fourth segment (1.21 seconds). These results show a substantial increase in the pace in the fourth segment, in relation to his previous performance.

Discussion

The results of the present intervention showed that the implementation of segmentation and instructional self-talk, enhanced the athlete's performance in the fourth segment of the 3000metres steeplechase. More specifically, these cognitive strategies facilitated a substantial decrease in the targeted split-times in the fourth segment during the race. Segmentation favoured a more organised and purposeful behaviour between

each segment, and also provided specific guidance not unlike short-term goals. Instructional self-talk cues (whether assisted or self-regulated) served as a means to trigger automatic execution and to regulate the athlete's effort. Hence, instructional self-talk has lent support for the notion that it can serve the function of strategic cognitive processing in a controlled environment in aerobic endurance. A multidisciplinary approach to practicing applied sport psychology, in collaboration with other sport science experts (biomechanics in our case), has provided the desired results. Additionally, in a post-race interview, C reported being more in control of his actions during the competition, he felt more confident, and regulated his effort more efficiently.

In line with contemporary research on cognitive strategies in aerobic endurance (Buman et al. 2008; Díaz-Ocejo et al., 2009; Díaz-Ocejo and Mora-Mérida, 2010; Giacobbi and Brewer, 2008; Hutchinson and Tenenbaum, 2007; Stanley et al., 2007), this work originates from the assumption that the enhancement of

aerobic endurance is of complex nature. Perceived effort is understood as one aspect within a multidimensional and multifaceted pool of cognitive resources in the endurance athlete. The aerobic endurance performance does not just rely in the ability to sustain effort and to cope with perceived effort (and associated cognitions; i.e. association), but also in the ability to plan, organise and execute the desired purposeful behaviour, among others. Recent research has signified the multidimensional approach to understanding aerobic endurance. Hutchinson and Tenenbaum (2006) have noted that affect and motivation are strongly related to perceived effort. Hall et al., (2005) have defended self-efficacy and perceived competence as indicators for aerobic endurance performance, while Díaz-Ocejo and Mora-Mérida (2010) have situated perception as an essential mechanism for the enhancement of cognitive processing in aerobic endurance.

The results from this applied experience suggest that there is a need for further research in this multifaceted phenomenon. A combination of segmentation and an instructional self-talk strategy has provided the desired result along with physical training in an aerobic endurance event. Future research on self-talk should address its functions beyond power or precision tasks, and study its possibilities in aerobic endurance sports. It appears

that instructional self-talk may as well guide behavior and assist cognitive engagement in aerobic endurance events. Likewise, applied sport psychology practice with long distance athletes needs to integrate other information processing aspects, beyond the well-established cognitive strategies association/dissociation. Consequently, segmentation and its implications for aerobic endurance, and the benefits of instructional self-talk for planning and executing these events, are deemed appropriate for such purpose. Despite the fact that self-talk research has justifiably focused on the effects of self-talk on performance, future research should include a larger sample and a control group to further endorse its use in aerobic endurance settings. Researchers interested in the self-talk literature and research should also address the methodological shortcoming of its assessment. In this intervention, the assessment of the self-talk usage has been a limitation. Moreover, any performance increase in endurance sports cannot solely be attributed to enhanced psychological skills. The ultimate goal of the sport psychology research and practice in this regard, should orientate its efforts to allow endurance athletes to better cope with perceived effort, enhance their cognitive processes, and to optimize strategic decision making in real competitive settings.

UNA INTERVENCIÓN PARA INTENSIFICAR EL LOGRO DE UN ATLETA DE CARRERA DE OBSTÁCULOS DE 3.000 MS., USANDO SEGMENTACIÓN Y AUTOHABLA

PALABRAS CLAVE: Incremento de logro, Carrera de obstáculos, Segmentación, Autohabla.

ABSTRACT: Se realiza una intervención con un atleta de 3000 metros obstáculos con el objetivo de mejorar su rendimiento en el cuarto segmento de la pista. Las tres fases de la intervención tuvieron como objetivo la instauración de estrategias de segmentación y auto-verbalización de instrucción. Los resultados del segundo vídeo análisis biomecánico mostraron una mejora sustancial del rendimiento del atleta en el cuarto segmento de la pista ($t = 1.21$ segundos). El protocolo de registro guiado mostró un alto porcentaje de uso de las auto-verbalizaciones (85.8% en los primeros 3 segmentos; 100% en el cuarto segmento). Se concluye que la auto-verbalización puede mediar en los procesos cognitivos para la mejora de la resistencia dinámica.

INTERVENÇÃO PARA INTENSIFICAR OS OBJECTIVOS DE UM ATLETA DE UMA CORRIDA DE OBSTÁCULOS DE 3.000 M., USANDO SEGMENTAÇÃO E AUTO-AFIRMAÇÕES

PALAVRAS-CHAVE: Aumento do rendimento, Corrida de obstáculos, Segmentação, Auto-afirmações.

RESUMO: Foi realizada uma intervenção com um atleta de 3000 obstáculos com o objetivo de melhorar o seu rendimento no quarto segmento da pista. As três fases da intervenção tiveram como objectivo a implementação de estratégias de segmentação e auto-verbalização de instrução. Os resultados do segundo vídeo de análise biomecânica mostraram uma melhoria substancial do rendimento do atleta no quarto segmento da pista ($t = 1.21$ segundos). O protocolo de registo mostrou uma elevada percentagem do uso das auto-afirmações (85.8% nos primeiros 3 segmentos; 100% no quarto segmento). Conclui-se que a auto-verbalização pode mediar os processos cognitivos para a melhoria da resistência dinâmica.

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