Goal-directed self-talk used during technical skill acquisition: The case of novice Ultimate Frisbee players

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Even though goal-directed self-talk is a key element in self-regulated learning, providing instruction and giving feedback during technical skill acquisition, few studies have explored the specific functions with which it might enhance learning and improve performance. Therefore, immediately after a training session, 32 novice Ultimate Frisbee players (M_{age} = 22.88, SD = 9.71) were asked to report as many self-instructions as they remembered using before task execution, after unsuccessful throws, and after successful throws. A hierarchical content analysis indicated that players used mainly instructional self-talk in all situations. However, instructional self-talk was aimed at technical aspects before their throws; at negative reinforcement, error detection and technical adjustment after unsuccessful throws; and at positive reinforcement and technical transference after successful throws. Other functions of self-talk were confidence-enhancement and goal-promotion. Overall, we discussed that goal-directed self-talk is a relevant self-regulated learning strategy, employed by novice Ultimate Frisbee players when acquiring technical skills.

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"Tell me and I forget. Teach me and I remember. Involve me and I learn". This famous quote by Benjamin Franklin illustrates how important active involvement in learning is for learning. In this sense, self-directed attention-focusing strategies such as goal-directed self-talk may be critical in getting athletes actively involved in the motor learning process (Cutton & Landin, 2007; Latinjak, Torregrosa, & Renom, 2011), especially when coach instruction and feedback are unavailable due to class size or time constraints. In this study, we define goal-directed self-talk as (a) an act of syntactically recognisable communication (Van Raalte, Vincent, & Brewer, 2016), articulated either audibly or subvocally (Theodorakis, Weinberg, Natsis, Douma, & Kazakas, 2000), addressed to the self, with interpretative elements associated to its content (Hardy, 2006); (b) which is an expressive of a controlled mental process deliberately employed towards solving a problem or making progress on a task (Christoff, Gordon, & Smith; 2011; Latinjak, Zourbanos, López-Ros, & Hatzigeorgiadis, 2014). Examples of goal-directed self-talk would be an athlete telling him or herself: *bend your knees* to improve technically prior to or during task execution; *calm down* to decrease physical arousal while experimenting anxiety, or *anyone can make mistakes* to feel less guilty after committing a decisive mistake. In this study, we focused, on the functions of self-talk, that is, the aims to which self-talk in used to facilitate skill acquisition and enhance performance.

One major line of research on goal-directed self-talk has focused on the aims to which goal-directed self-talk is used by athletes (e.g., Theodorakis, Hatzigeorgiadis, & Chroni, 2008). Basically, a major distinction was made between motivational and instructional self-talk (Theodorakis et al., 2000). With regard to specific motivational functions, self-talk can help to regulate effort, psych up, build self-efficacy, boost confidence, control cognitive and emotional reactions, control anxiety, and relax. With regard to specific instructional functions, self-talk can help to enhance concentration, provide feedback, direct and redirect focus of attention, and trigger automatic responses (Hardy, Hall & Hardy, 2001; Theodorakis et al., 2008). According to research, instructional self-talk is better adapted to technical and precision tasks (e.g., Latinjak et al., 2011; Theodorakis et al., 2000), whereas motivational self-talk adapts better to strength and endurance tasks (e.g., Tod, Thatcher, McGuigan, & Thatcher, 2009; Van

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Raalte, Morrey, Cornelius, & Brewer, 2015). Despite these relevant advances regarding self-talk functions, research has principally focused on general self-talk functions in specific tasks (e.g., instructional and motivational self-talk [general functions] in strength and precision tasks [specific tasks]; Hatzigeorgiadis, Theodorakis, & Zourbanos, 2004) or on specific self-talk functions in the general sport contexts (e.g., automatic self-talk subcategories [specific functions] in sports [general context]; Zourbanos, Hatzigeorgiadis, Chroni, Theodorakis & Papaiannou, 2009; Theodorakis et al., 2008). Hence, there is a dearth of evidence regarding the specific self-talk functions in specific sport tasks.

Accordingly, the overall purpose of this study was to explore novice athletes' use of goal-directed self-talk during technical skill acquisition in training. We framed the present study within the context of Ultimate Frisbee, and, specifically, we examined self-talk during the acquisition of forehand and backhand throws. Ultimate Frisbee was chosen as it is a new and increasingly popular sport that posits technical demands on the players (Scanlan, Kean, Humphries, & Dalbo, 2015; Solomon, Banerjee, & Horn, 2014). Moreover, despite its popularity, there is still very little known about the physical demands associated with Ultimate Frisbee and, therefore, the optimal training, preparatory, and recovery approaches for players are likely still to be developed (Madueno, Kean, & Scanlan, 2017). Learning about Ultimate Frisbee players' self-talk during skill acquisition, could also shed light on technical difficulties the players experience during their sport initiation. Novice players were chosen because novice players have greater needs to focus on learning technical skills.

The provision of guidance and information in learning environments was described as a continuum between instruction and feedback (Hattie & Timperley, 2007). Hence, we explored goal-directed self-talk in situations that require instruction (before forehand and backhand throws) as well as feedback (after forehand and backhand throws). Considering that feedback may follow successful and unsuccessful task executions, we explored goal-directed self-talk in a total of three situations: before throws; after unsuccessful throws, and after successful throws. As forehand and backhand throws are short actions, self-talk during task execution was not targeted. In relation to our hypotheses: since forehand and backhand throws in Ultimate Frisbee are precision tasks, a majority of instructional self-talk was expected. Furthermore, it seemed reasonable to anticipate that the specific instructional functions of goal-directed self-talk would vary as the challenges for the athlete varied from one situation to another.

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Method

Participants

Ten out of twelve Catalan Ultimate Frisbee teams agreed to participate. All players of those teams with less than one year of experience were invited to participate in this study. A total of 32 novice Ultimate Frisbee players (25 males and 7 females; M_{age} = 22.88, *SD* = 9.71) agreed to participate in this study. That is, a great part of the entire Catalan population of unexperienced Ultimate Frisbee players participated in this research. Only very few players could not participate due to time-constrictions. At the time of data collection, these unexperienced players ($M_{experience}$ = 6.67 months; *SD* = 3.46; maximum = 11 months) were all actively engaged in structured training ($M_{practice}$ = 4.09 hours/ week, *SD* = 1.85). Before beginning the study, we obtained all the necessary institutional permissions, including paternal consent in the case of under-age participants.

Procedures

One researcher met the participants in small groups of up to four players at their training location after their training session. Previous studies have successfully collected their data in small groups (Latinjak et al., 2014). First, the researcher explained the procedures of the study to the participants. Specifically, the participants were told that *in this study we want to know what each one of you tells him/herself to learn the forehand and backhand throw*. The participants were further informed that they would have to remember forehand and backhand exercises they just had practiced during training and their goal-directed self-talk during these exercises. Moreover, during the data collection, participants were asked to sit two meters away from each other and to avoid conferring. If participants had no further questions, the data collection commenced.

The participants then signed the informed consent form and answered a short questionnaire regarding descriptive data. Afterwards, they remembered exercises in their training on forehand and backhand throws, as well as successful and unsuccessful throws. In order to sample their goal-directed self-talk, an open question successfully employed in previous research on goal-directed self-talk (e.g., Van Raalte et al., 2015) was chosen. Specifically, the participants were asked to write as many self-instructions as they remembered giving themselves to improve their performance or make progress on the task (a) before a throw, (b) after unsuccessful throws, and (c) after successful throws. Success and failure were, primarily, determined by the players' subjective performance evaluations, and, secondarily, defined by the successful reception of the frisbee by another

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member of the team. They were also asked to give no answer if they were unsure and to write as many answers as they deemed appropriate.

Data analyses

Qualitative data analyses were carried out following guidelines offered by Sparkes and Smith (2014). Resuming the steps undertaken in the hierarchical content analysis, initially, the team of analysts read all answers twice before labelling the emergent themes in each participant's responses. The team of analysts consisted of a researcher with experience in self-talk and qualitative analyses and an Ultimate Frisbee player and coach. Afterwards, the themes among the participant's responses were connected and ordered. Moreover, subthemes were grouped in higher-order themes. Different clusters emerged for each situation: before throwing, after unsuccessful throws and after successful throws. With the final cluster of themes in hand, the two analysts went back to the original answers and checked that all responses could be adequately placed within the schemes. Finally, an investigator who had not been part of data collection or data analysis, but who had experience in qualitative research, reviewed the analysis. Once we had obtained the final coding scheme, two authors engaged independently in the codification of all themes. Inter-rater agreement ([number of agreements / number of themes] *100) was 93% for self-talk functions before task executions, 87% for self-talk functions after unsuccessful throws, and 91% for self-talk functions after successful throws. In cases of disagreement, both coders convened to discuss until agreement was reached. It is important to note that, although counts of themes and percentages are provided in the result section, these do not indicate the importance of each category (Sparkes & Smith, 2014).

Results

From the qualitative analyses, different coding schemes in each situation emerged for the self-talk functions (see, Table 1). In other words, the participants gave different answers across the three situations when asked for the self-statements they had used. Before a forehand and backhand throw, self-talk was mainly instructional, controlling cognition and behaviour (n = 140; 84%). Most of these instructional statements were aimed at the specific technique employed in the forehand and backhand throws (n = 116; 70%): for example, "wrist snap", "open fingers", "keep your head up", "extend your arm", "bend your knees", or "lean forward". The rest of the instructional statements were aimed at the intention of the throw (n = 24; 14%): for example, "distance and strength", "flat", or "spin". The second salient category included future-oriented self-talk (n = 20; 12%), which was mainly aimed at confidence boosting (n = 17; 10%): for example, "it

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will work out just fine", "you can" or "you can't miss". In short, novice players in a technical task used mainly instructional self-talk aimed at technical aspects before task execution.

After unsuccessful throws (Figure 1), self-talk was frequently categorized as reactions to failure (*n* = 63; 38%), which included error descriptions (*n* = 24; 15%; e.g., "my wrist bent", "I haven't followed through with my arm", or "too strong") and negative reinforcement (*n* = 32; 19%; e.g., "you've done wrong", "that was crap", "you messed up"). Equally frequent, self-talk was categorized as instructional, controlling cognition and behaviour (*n* = 64; 39%). In contrast to the situation before throwing, this category included self-talk aimed most frequently at technical adjustments (*n* = 38; 23%; e.g., "lift your arm a bit higher", "more wrist movement", or "change the spin"), and less frequently on technical instructions (*n* = 11; 7%; e.g., "wrist movement") or control of attention (*n* = 15; 9%; e.g., "focus on your alternatives"). Lastly, the third large category included future-oriented self-talk (*n* = 24; 15%), which was aimed at confidence boosting (*n* = 15; 9%; e.g., "next time will be better") and goal-orientation (*n* = 9; 5%; e.g., "I have to improve a lot", "I need to keep practicing"). In brief, after unsuccessful throws, novice players used negative reinforcement to gain awareness of their mistakes, instructional self-talk to adjust their technique and improve in forthcoming attempts, and future-oriented self-talk to boost confidence and adjust their goals.

After successful throws (Figure 1), self-talk was mainly categorized as reactions to success (*n* = 101; 66%), which included foremost positive reinforcements (*n* = 82; 54%; e.g., "well done", "I'm proud", "this is me" or "the more you practise, the better you are"), but also error detections (*n* = 9; 5%; e.g., "still not far enough", "you could have swung better", or "good but it could have been more accurate"). Besides reactions to success, self-talk was also instructional (*n* = 17; 11%), in terms of task focus (*n* = 6; 4%; e.g., "get back to your position", or "the game continues") and technical transference (*n* = 11; 7%; e.g., "remember the way you put your hand", or "keep doing the same"); and future-oriented (*n* = 23; 15%), aimed at goal-promotion (*n* = 14; 9%; e.g., "now all of them the same way", "I have to repeat that", or "try to improve even more") and confidence boosting (*n* = 9; 6%; e.g., "you'll be able to repeat that again"). To sum up, after successful throws, novice players used positive reinforcement to congratulate themselves on their accomplishment, instructional self-talk to transfer their technique from past accomplishments to upcoming challenges and future-oriented self-talk to boost confidence and adjust their goals.

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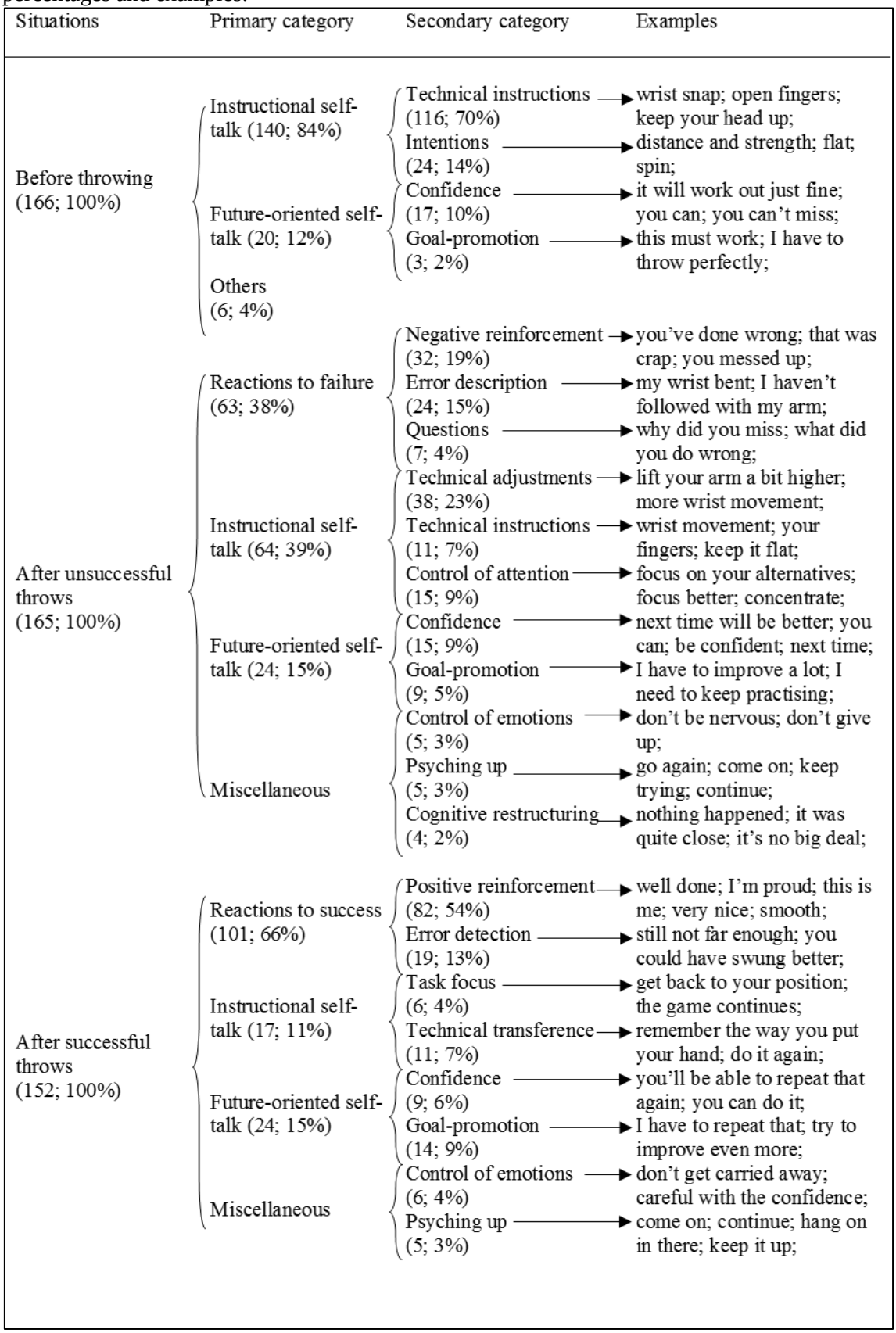
Figure 1. Hierarchical trees for self-talk functions in each situation, together with frequencies, percentages and examples.



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Discussion

In the following section, we comment some of the more remarkable findings regarding the purpose of this study: to explore novice athletes' use of goal-directed self-talk during technical skill acquisition in training. Overall, instructional self-talk aimed at cognitive and behavioural control was a key element in athletes' self-dialogue during skill acquisition. In previous studies, instructional self-talk was identified as aiding performance by directing the focus of attention to task-relevant cues (Ziegler, 1987), enhancing concentration (Hatzigeorgiadis, Zourbanos, & Theodorakis, 2007) and providing knowledge of performance feedback (Cutton & Landin, 2007). The innovative contribution of this study was the description of differences in the content of instructional self-talk depending on the situation. Before task execution, athletes provided themselves with technical instructions (e.g., extend your arm), similar to those used in instructional self-talk interventions (e.g., Latinjak et al., 2011), whereas between task executions, instructions were frequently transformed into both error descriptions (e.g., you've bent your arm) and technical adjustment following errors (e.g., extend your arm further), or into technical transference following success (e.g., keep extending your arm). In instructional self-talk interventions, the cue words did not change as a function of performance (the athlete always repeats "extend"). In future studies on self-talk interventions, it could be of interest to add variations (*extend further* in case of failure; or *keep extending* in case of success) instead of mechanically repeating the same cues regardless of the athlete's performance.

After task execution, participants reported to have given themselves feedback, both positive and negative, in the forms of positive and negative reinforcement and error description. The use of negative feedback might seem surprising. However, research in the area of feedback indicated that the detrimental effect of negative feedback on performance is smaller in sports compared to other activities (Kluger & DeNisi, 1996). It has been suggested that sport performance is affected simultaneously by many factors, which can be altered differentially by feedback (De Muynck et al., 2017). For example, negative feedback may simultaneously increase tension (Whitehead & Corbin, 1991) and effort (Weinberg, Gould, & Jackson, 1979), whereby the benefits associated with increased effort counterbalance the adverse effect of tension on performance. Therefore, research attention has recently shifted towards the circumstances under which negative feedback (aka, change-oriented feedback) is beneficial for performance (e.g., Carpentier & Mageau, 2013, 2014, 2016). Specifically, negative feedback should avoid being

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person-related, be given in an empathic way with a considerate tone of voice, accompanied with tips and choices of solutions and be directed towards clear and attainable objectives. With regard to self-talk, we believe that negative reinforcement and error description embedded in athletes' self-talk could be as beneficial for motivation and performance as negative feedback, especially if it is accompanied by technical instructions.

With regard to self-talk that was not categorized as instructional, participants reported self-statements aimed at confidence and goal-promotion. The confidence function of self-talk is well supported in self-talk literature (Theodorakis et al., 2008; Zourbanos et al., 2009), and Hardy, Hall and Hardy (2005) had already discussed the goal and motivation functions of self-talk. As can be inferred from the self-statements reported by the participants, both mastery (e.g., "try to improve even more") and performance goals ("I have to throw perfectly") were promoted using self-talk. Nonetheless, the number of meaning units categorized as goal-promotion in each situation was too small to perform additional inductive analyses.

At this point, potential limitations of the study should be acknowledged. First, the self-talk-sampling strategy should be taken into consideration, because it might have accessed biased memory. Yet the time elapsed since the actual situations took place was remarkably shorter (just after the training) compared to previous studies (one month; e.g., Latinjak et al., 2014). Moreover, all thought-sampling procedures have limitations as they rely on conscious awareness and memory (Nisbett & Wilson, 1977). Furthermore, when interpreting the results of this study, the homogeneous sample should also be taken into consideration. We chose a homogeneous sample to explore the use of goal-directed self-talk in a specific group of athletes. In addition, there is no reason to believe that only Ultimate Frisbee players use goal-directed self-talk or that no one else uses the categories of self-talk they have used. Self-instructions controlling cognition and behaviour, for example, have been observed in primary and secondary school students (Zourbanos, Papaioannou, Argyropoulou, & Hatzigeorgiadis, 2014). All that considered, future studies should target different populations in different tasks and contexts, sampling goal-directed self-talk with different methodologies (e.g., concurrent thought-sampling techniques; Calmeiro & Tenenbaum, 2011), to verify and expand on the results of this study.

Despite its limitations, this study has illustrated a self-regulated learning strategy, employed by novice Ultimate Frisbee players: goal-directed self-talk. Our results shed

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light on internal processes relevant to technical skill acquisition (Ziegler, 1987), which coexist, maybe at times, compete with external instructions and feedback from the coach. The results of this study are also relevant for research on, and applications of self-talk interventions. It has widely been acknowledged that the specific self-talk functions should be matched to task requirements (Hatzigeorgiadis, Zourbanos, Latinjak, & Theodorakis, 2014). This study has uniquely captured interactions between instructional self-talk content and performance outcomes. Accordingly, athletes' in self-talk intervention should not only create and use self-talk plans, but also learn to adapt their cue words to forthcoming actions as well as past, successful and unsuccessful, attempts.

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