



Performance and decision making in rugby union: Influence of team-based goals and task complexity^{☆, ☆ ☆}

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ABSTRACT

Aims: Success in rugby union games requires players to dynamically adjust their actions to the game situations. However, action selection might be influenced by players' social environment. This study investigates how individual and team-based motivational goals and task complexity affect rugby players' decision-making behaviour in a representative small-sided game. We hypothesised that priming a team-based goal would benefit performance and that ball carrier's action would differ between individual and team-based goal conditions only in complex game situations.

Methods: A three against three rugby situation was designed with two levels of task complexity manipulated by setting two defensive conditions. The motivational goals (either individual or team-based) were primed by a cover story. Participants were 102 rugby players from elite training centres. Their performance during the games were analysed from video annotations of their actions and from their position on the pitch obtained with wearable GPS sensor data.

Results: Contrarily to previous findings, performance was better when priming an individual goal. Players' decision was significantly influenced by the goal orientation. More precisely, when priming an individual goal, rugby players appear to be more responsive to available spaces for themselves, as suggested by the higher proportion of runs observed, and less responsive to available spaces for their teammates (and conversely when priming a team-based goal), especially in complex situations.

1. Introduction

1.1. Decision making in rugby union

Rugby union is characterized by uncertainty in the unfolding of the game, making ability to successfully adapt actions to the dynamically changing environment a key aspect of rugby players' performance (Passos et al., 2008). The ecological dynamics approach to perception and action proposed that adaptive behaviour in team sports relies on perception of affordances (i.e., opportunities for action offered by the environment) (Button et al., 2021). In team sports context, three forms of affordances can be accounted for: affordances for another player (i.e.,

the actions that another player can perform), affordances of another player (i.e., the actions that the perceiver can perform given the actions of the other players) and affordances for joint action (i.e., the actions the perceiver and other players can perform cooperatively) (Fajen et al., 2008). Thus, decision making in team sports is the results of player's active exploration of their surroundings for affordances relevant to performance (Araújo et al., 2017).

In rugby union, decision making of the ball carrier was investigated using experimental tasks manipulating the location of gaps in defence (Correia et al., 2012; Watson et al., 2011). For example, manipulation of gaps opening in virtual rugby task where three attackers faced three defenders was shown to affect decision making behaviour by inviting

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different opportunities for actions for the ball carrier (Correia et al., 2012). According to the gap location in the defence, the ball carrier was able to correctly perceive which running channel was opening and act accordingly: either run in their own channel, pass short to the first teammate, or pass long to the second teammate. However, performance was better when the opening gap was for the ball carrier than when it was for his/her teammates (Correia et al., 2012). The results of this study also showed that expertise in rugby enhanced performance in the task by increasing selection of more adapted solutions, particularly when a gap was opening for a teammate. Overall, this study showed that the ball carriers had more difficulty to perceive affordances for others than for themselves, possibly because of the availability of information about gap opening for others from their own position, but this effect appears to decrease as players gain in expertise by increasing their responsiveness to social affordances (Correia et al., 2012). The development with expertise of the ability to perceive more goal-relevant affordances and to be able to select the most appropriate one among them appears to be particularly adaptive to solve complex situations encountered in team sports where many possibilities are available (Fajen et al., 2008).

The kinematic variables used to inform the decision to pass or to run were also investigated in a two against one rugby task (Passos et al., 2012). In this study, the ball carrier' decision (passing or running) appeared to be constrained by previously trained behaviour related to this specific task, that is "to commit the tackler before passing the ball to the support player". For example, the ball-carrier decision was not influenced by the relative distance of the ball carrier and the defender from the nearest side-line, suggesting that, although a running channel was opened or closed between the defender and the side-line, the ball-carrier did not use this information to pass or go forward. Thus, this study suggests that ball carrier' decision making in such a task is influenced by team expectations, impeding perception of some available affordances (e.g., the opportunity to go forward).

As previously emphasized, the coordinated movements between teammates that we can observe in team sports are the results of players' attunement to affordances for others and affordances of others (Fajen et al., 2008). This provides performers with a dynamic landscape of social affordances composed of all opportunities for action available in limited space and time windows (Passos et al., 2020; Rietveld & Kiverstein, 2014). Performers selective engagement with this landscape of affordances is shaped by their intentions, forming a set (or field) of relevant affordances for a particular situation (Bruineberg & Rietveld, 2014). The sharing of affordance perception between teammates can therefore facilitate interpersonal coordination with functional adaptation of one's own behaviour to others in a coherent and effective manner, but it requires that teammates aim at common team task goals (Silva et al., 2013). Indeed, teammates can present affordances for each other by generating information through their motion or position relative to others. This makes the dynamic landscape of social affordances acts as a system of communication for teammates that would support interpersonal coordination (Correia et al., 2012; Silva et al., 2013). Therefore, perceiving what teammates can do in relation to the team-based goals is a key for solving complex situations (i.e., situations with many possible opportunities for action available to achieve the task) requiring collaborative actions.

1.2. Personal and social identity in team sports

Tamminen et al. (2016) qualitative study well highlighted the complexity of the intertwining between individual and team-based goals. How do the athletes' dilemma between individual and team-based goals affects their behaviour was indeed investigated using a socio-cognitive approach, particularly through the Social Identity Approach (SIA; Haslam, 2004). This theoretical framework emphasises on the importance of group membership and social context on individual behaviour (see Rees et al., 2015 for a review). Relatedly, Identity-Based

Motivation theory (Oyserman et al., 2007) posits that the context cues a social identity that implies readiness to act in ways that are congruent with the activated identity. An athlete's sense of self is influenced by membership in social groups, such as sports teams, which helps to know how to behave in relation to others, particularly in- and out-group members (e.g., teammates and opponents) (Ellemers, 2012). According to the context, athletes define themselves, and behave, relative to different social identities, or to a personal identity (Haslam, 2004). In short, they define themselves as a member of a group (i.e., "we" and "us" against "them"), or as unique individuals (i.e., "I" and "me" in comparison to others). As the level of self-abstraction resulting in the activation of a social or a personal identity guide behaviour and emotions (Haslam et al., 2020), it needs to be now further understood in the context of team sports.

From an ecological dynamics perspective, athletes' social environment would shape their intentions and their engagement with the landscape of available affordances, affecting the width of the field of affordances perceived as relevant in a given situation and the saliency of these affordances (Rietveld et al., 2013). From this perspective, activation of social and personal identities can be expected to change the athletes' field of affordances and consequently, the selection of affordances in a given context (Araújo et al., 2017). This impact of the social environment on the decision making behaviour of athletes could help explain the difference in collective performance observed when social and personal identity are manipulated (e.g., Campo et al., 2019). For example, identity processes have been shown to affect players' emotional experiences during a rugby union game, with players who identified to their team experienced more positive team-referent emotions than players at a personal level of identity (Campo et al., 2019). In addition, personal and social identities can also be activated simultaneously in team sport context, leading, for example, to mixed emotions related to both identities (Campo et al., 2019, 2018, 2017). These different emotional states would be expected to affect the saliency of social affordances and the intentions of the athletes, therefore inviting for different affordances selection (Araújo et al., 2017; Dings, 2018; Withagen et al., 2017). In the same vein, athlete can focus on both personal' and team's goals which may also affect decision making if these goals promote different behaviours. For example, rugby players in possession of the ball may want to show off their skills by crossing the defence for personal interest, when from a team perspective, the situation would require a pass. It is important to note that none of these behaviours should be specifically associated with a particular identity. For example, crossing the defence might also be relevant from a team perspective in another situation. But when personal identity is activated, knowing teammates' expectations may therefore affect decision-making by dividing attention to the relevant cues for the behaviours related to both personal and team goals. Thus, the activated identity might affect players' responsiveness to social affordances.

1.3. Aims of the study

The aim of this study was to investigate the impact of rugby players' commitment to individual or team-based goal and task complexity on in-game performance and decision making. In terms of performance, we hypothesised that pursuing a team-based goal (i.e., promoting the team identity) would positively influence team's performance (Campo et al., 2019; Slater et al., 2019). Regarding decision making, we addressed the following research question: Is the effect of players' level of identification to their team on decision making modulated by task complexity? On the one hand, we hypothesised that only in high complex task (i.e., defence situation that offers more pass opportunities) player's level of identification to the team would affect decision making, as the pursuit of individual goals would interfere with the team's expectations. On the other hand, we hypothesised that in low complex task (i.e., defence situation with one more obvious solution of pass), the level of identification to the team would not affect decision making.

2. Materials and methods

2.1. Participants

The protocol was approved by a national research ethics committee (CERSTAPS) [approval number IRB00012476-2022-20-01-147]. Participants were 102 rugby players (including 30 females) who trained at nine different elite training centres. The players were aged between 15 and 21 years, with $n = 24$ under-16s, $n = 45$ under-18s and $n = 33$ under-21s. Data collection took place over nine sessions in the training facilities of each centre, so that nine to 12 players were tested in each session. During each session, the coach formed teams of three players with similar playing levels and representative profiles (forward / backward players). In total, 34 teams were tested.

2.2. Manipulation of the goal orientation

Based on Campo et al.' methodology (2019), a cover story was created to distract the participants from the true purposes of the study, which were presented during a debriefing at the end of the session. The experimenters introduced themselves as members of a research project involving different team sports federations to prepare the 2024 Paris Olympics games. This project was presented as aiming to develop key performance indicators in an unbalanced situation (i.e., a situation in which the attacking team has a numerical advantage) to select players and teams with high potential. To do so, the session was presented as consisting as a pair of tests: a test of the individual performances and a test of the collective performances.

In the test of the individual performances, the participants were told that their individual performances will be assessed and that the two individuals of the session showing the best performances would be selected to take part to a skill development programme with athletes from the other team sports federations involved in the research project. In this condition, the participants from the same team wore different coloured shirts to play. The purpose of these individual goals and manipulation was intended to make personal-level concerns more salient. This condition is referred to as the Individual Motivational Goal condition (IMG).

In the test of the collective performances, the participants were told that the performance of their team will be assessed and that the four best teams observed in the sessions of data collection would lead to the selection of all the players of the four team's centres to take part to a collective skill development programme with teams from the other team sports federations involved in the research project. In this condition, the participants from the same team wore identical shirts to play. The purpose of these team-based goals and manipulation was intended to make social-level concerns more salient. This condition is referred to as the Team-based Motivational Goal condition (TMG).

2.3. Protocol and task

The task was a three against two-plus-one small-sided rugby union game on a 15×20 -m pitch. The task goal for the attacking team was to score a try while avoiding contact, and for the defending team to prevent them to do so by either i) intercepting the ball or ii) tackling the ball carrier to the ground or out of the pitch. Ball kicking and pursuit tackles were forbidden. The defence was set in two defensive lines consisting of two and one player respectively. Each defensive line could only attempt to stop the attack in one half of the pitch (Fig. 1).

Each team completed a total of 24 trials as the attacking team (see the session schedule in Table 1). The trials were shared in two blocks of 12 trials, one block per motivational goal conditions (IMG and TMG). Before starting a block in IMG or TMG, the players of the attacking team were reminded the motivational goals, and their shirt was changed accordingly.

During the blocks, the attacking team was confronted to two

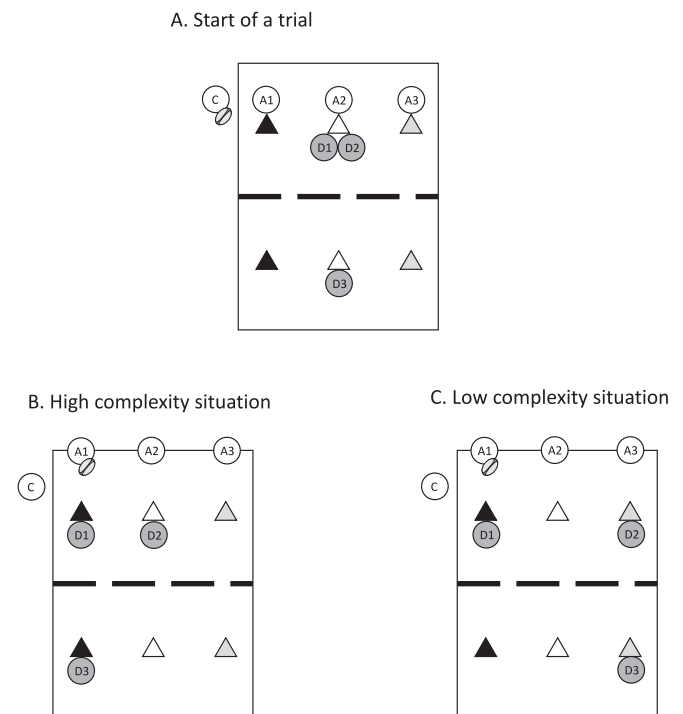


Fig. 1. Positions of players in the small-sided at the start of a trial (A) and at the launched of the ball in the high complexity (B) and low complexity situation (C). Circles represent the coach (“C”), the attacking players (“A1”, “A2” and “A3”), and the defending players (“D1”, “D2” and “D3”). The dashed line represents the limit that the first line of defence (D1 and D2) and the second line of defence (D3) could not cross. This limit was represented by cones placed at the middle of the field. The coloured triangles represent cones that were placed on the field at 2.5, 7.5 and 12.5 m from the side lines. They were used to set the positions of the defending players.

Table 1

Schedule of the sessions with four or three teams.

Block	Attacking team	Defending team	Motivational goal	Number of trials
Schedule with 12 players – 4 teams				
1	Team A	Team B	Individual	12
2	Team C	Team D	Team-based	12
3	Team B	Team A	Individual	12
4	Team D	Team C	Team-based	12
5	Team A	Team B	Team-based	12
6	Team C	Team D	Individual	12
7	Team B	Team A	Team-based	12
8	Team D	Team C	Individual	12
Schedule with 9 players – 3 teams				
1	Team A	Team B	Individual	12
2	Team C	Team A	Team-based	12
3	Team B	Team C	Individual	12
4	Team A	Team B	Team-based	12
5	Team C	Team A	Individual	12
6	Team B	Team C	Team-based	12

situations (a low and a high complexity situation, LC and HC respectively). Task complexity was manipulated by the initial position of the three defenders (Fig. 1). The two situations were designed by two expert rugby coaches. They were chosen among four situations tested in a pilot study. The attacking team was confronted to the two situations in a random order during the block, with the constraint that six trials were performed in each situation during a block. The roles of the players were attributed semi-randomly so that each player had the three roles twice in the two game situations during one block. Two experimenters placed on

opposite sides of the pitch announced the roles for the attackers and defenders respectively before each trial. In addition, the experimenter with the defenders announced which situation to set (Fig. 1B and C).

The trials started with the attackers 5 m inside the pitch with the two defenders of the first line of defence. The third defender was 5 m inside the pitch from the try line. All the defenders were at 7.5 m from the side lines. The coach was holding the ball outside the pitch near the side line, on the right of the first attacker (A1 on Fig. 1). When all the players were in this starting position, the coach announced “ready”. On this signal, the attackers ran back to the limit of the pitch and the defenders ran to the location corresponding to the set either the LC or HC situation. Then, the coach announced “go” and pass the ball to the first attacker. At this signal, the first line of defence had to go forward to defend. The third defender could move in the second half of the pitch but could not defend before that the ball carrier crossed the midline of the pitch. The trial stopped when i) the attackers scored a try, ii) the ball or ball-carrier was outside the pitch, iii) the ball-carrier was tackled to the ground or iv) a defender intercepted a pass. At the end of a trial, the attackers and defenders went to the experimenters to know their role in the following trial.

2.4. Data collection

The effect of the identity manipulation was checked with a 10-cm bipolar visual analogue scale (VAS) before each block of plays and right after priming the individual or team-based goal (Campo et al., 2019). Players could read on the left anchor “what is the most important for me is to perform better than the other members of my club” and on the right anchor “what is the most important for me is that my club wins the challenge”. Participants indicated their answers by marking a vertical line on the scale, and the measures were reported at the nearest millimetre.

All the trials were filmed with a 50-fps camera on 1920×1080 pixels frames. The camera was placed on a mat (Hi-pod, USA) to cover the entire pitch. Two coders used the video to annotate when an attacking player receives or passes the ball, and when the trial stopped. The coding of the videos was performed on Dartfish© software (version Pro S, Fribourg, Switzerland). The inter-coder agreement was assessed on three randomly selected blocks of 12 trials each. The results showed perfect agreement on the results of the trials (100 % agreement; kappa = 1) and a 97.5 % agreement on the identity of the player in possession of the ball (kappa = 0.96). In addition, the mean absolute error of the time code of the coded events was 31 ms, with a 95 % confidence interval of 20 to 41 ms. In sum, the inter-coder agreement is almost perfect, and the coding of the event differs by only 1 to 2 frames.

The players' coordinates were recorded during the entire session with a 10 Hz wearable GPS system (Catapult, Australia). Each player was assigned a unit and a sports bra. The units were turned on at least 15 min before the start of the first play. In addition, the coordinates of the four corners of the pitch were recorded at the end of the session with two GPS units. The players' coordinates were converted to metres using the Universal Transverse Mercator, a rotation matrix was applied to have the length of the field as the horizontal axis and they were smoothed with a 3 Hz Butterworth low pass filter (Folgado et al., 2014). The video and the positional data were synchronized using the time of the first run of one of the attacking players. The synchronisation was double-checked with animated visualisations of the positional data and identification of key events such as stops or change of direction. This procedure was used to convert the raw positional data units into metres and align the x- and y-axes with the playing field's length and width, respectively.

There were two technical problems with the data collection. Firstly, at one of the training centres, the video was recorded at 30-fps instead of 50-fps. This affects the data related to 3 teams. Secondly, we were unable to export the GPS data collected at another training centre. This missing data relates to 4 teams. These teams' data were considered in the analysis for the dependent variables that did not require the GPS data.

2.5. Data processing

2.5.1. Decision making

The decision made by the first attacker could be a pass to A2, a skip pass to A3 or to cross alone the first defensive line. Using annotations of the videos, the decision made (pass, skip pass or run) was collected for each trial. In addition, the time of possession of the ball by A1 was collected.

When the decision was a pass, or a skip pass, two metrics were measured. First, the length of the pass was measured as the distance between the position of A1 when he/she passed the ball and the position of the receiver at ball reception. Second, the distance to the closest defender at the time of passing was measured. These measures have been taken to explore the context of the passes.

2.5.2. Performance

Performance was assessed with two metrics. First, the outcome of the trial was assessed as a success or a failure depending on whether the attacking team crossed the try line with the ball or not. Second, the longitudinal distance covered by the attacking team was measured on failed trials. This metric corresponded to the position on the length of the field of the last ball carrier of the attacking team at the end of the trial.

2.6. Statistical analysis

A Wilcoxon signed-rank test was performed to compare the VAS scores in IMG and TMG conditions. The rank-biserial correlation (r in the results) is reported as a measure of effect size.

A generalized mixed model for binomial data was used to test the influence of the goal orientation (individual vs team-based) and the task complexity on the frequency of tries scored. The model was fitted with the goal orientation, the task complexity and their interaction as fixed effects and the team id as a random intercept. The conditional R^2 (R^2_{cond} in the results) and the marginal R^2 (R^2_{marg} in the results) are reported as measures of the model' fit considering the variance of both the fixed and random effects, and the variance of the fixed effects only, respectively. The odds-ratio of the fixed effects (OR in the results) is reported as measures of effect size.

Influence of the goal orientation (individual vs team-based) and the task complexity on the decision of A1 (pass, skip pass or cross) was tested using a generalized linear mixed model for categorical data with a multinomial distribution. The model was fitted with the goal orientation, the task complexity and their interaction as fixed effects and the team id as a random intercept. The McFadden pseudo- R^2 (R^2 in the results) value is reported as an estimation of the model fit to the data. The odds-ratio of the fixed effects (OR in the results) are reported as measures of effect size.

The other dependent variables were tested with two factors repeated measures ANOVA (goal orientation x task complexity). Only the longitudinal distance covered was tested with a linear mixed model, including the motivational goal and the task complexity as fixed effects variables and the teams as random factors. This decision was made to avoid removing the data from the teams who did not fail to score a try in some conditions. For this model, R^2_{cond} and R^2_{marg} are reported as measures of the model' fit. The effect sizes for the main effects and interactions are reported as partial eta squared (η_p^2 in the results).

In all tests, alpha was set at 0.05 and post-hoc tests were performed with a Bonferroni correction. All statistical analyses were performed in jamovi (Version 2.6; The jamovi project, 2025).

3. Results

3.1. Identity

Team-based and Individual motivational goals significantly

decreased and increased VAS scores, respectively [$W = 2798, p < .001, r = 0.64$; Mean_{IMG} = 7.3, SD_{IMG} = 2.9; Mean_{TMG} = 8.8, SD_{TMG} = 1.5] (Fig. 2).

3.2. Performance

3.2.1. Frequency of tries scored

Overall, attacking teams scored on 60.8 % of the trials (Fig. 3A). A generalized linear mixed model ($R^2_{cond} = 0.08, R^2_{marg} = 0.02$) showed that teams scored 9.2 % more tries in LC than HC [$\beta = 0.41, OR = 1.51, p = .006$]. The goal orientation did not significantly influence the outcomes of the trials [$\beta = 0.05, OR = 1.05, p = .753$]. The interaction between goal orientation and task complexity was not significant [$\beta = 0.54, OR = 1.72, p = .068$], however, in IMG, attacking team scored 15.2 % more tries in LC than in HC ($p = .008$) whereas this success rate did not differ significantly between task complexity in the TMG ($p = 1.000$).

3.2.2. Longitudinal distance covered

A linear mixed model ($R^2_{cond} = 0.12, R^2_{marg} = 0.08$) showed that, on trials non-ending with a try, the attacking team covered 1.3 m more distance in IMG than in TMG [$F(1, 267) = 4.58, p = .033, \eta_p^2 = 0.017$]. Attacking team also covered 2.9 m more in LC than in HC [$F(1, 262) = 21.91, p < .001, \eta_p^2 = 0.077$] (Fig. 3B). However, the interaction between goal orientation and task complexity did not significantly influence the distance covered by the attacking team [$F(1, 263) = 0.85, p = .358, \eta_p^2 = 0.003$].

3.3. Decision making

3.3.1. Decision

The distribution of A1's decisions in the different conditions is presented in Fig. 4A. A generalized mixed model ($R^2 = 0.35$) showed that the decision of the first attacker was significantly affected by the task complexity [$\beta_{Pass-Run} = 1.88, OR = 6.53, p < .001$; $\beta_{Skip Pass-Run} = -1.90, OR = 0.15, p < .001$]. More precisely, the decision was in general to pass to A2 (86.0 % of trials whereas skip pass and crossing decisions represented 10.0 % and 3.9 %, respectively) in LC, whereas in HC, the decision was shared between performing a skip pass to A3 (46.6 %), passing to A2 (33.4 %) and crossing (20.0 %) ($p < .001$ for all comparisons between the two levels of complexity). The decision of the first attacker was also significantly influenced by the goal orientation [$\beta_{Skip Pass-Run} = -0.80, OR = 0.45, p = .021$; $\beta_{Pass-Run} = -0.32, OR = 0.73, p = .167$] with 5.0 % more crossing ($p = .033$) and 5.2 % less skip pass decisions ($p = .044$) in IMG compared to TMG. However, the goal orientation did not significantly affect the frequency of pass to A2 ($p = .856$). The interaction between the task complexity and the goal orientation was not significant [$\beta_{Pass-Run} = 0.36, OR = 1.44, p = .431$; $\beta_{Skip Pass-Run} = -0.26, OR = 0.77, p = .707$].

3.3.2. Time of possession of the ball

The time A1 was in possession of the ball before passing was significantly influenced by the interaction between the task complexity and the goal orientation [$F(1,33) = 5.41, p = .026, \eta_p^2 = 0.141$]. More specifically, in IMG, A1 kept the ball 0.13 s longer in HC than in LC ($p < .001$), whereas in TMG this time was not affected by the task complexity ($p = 1.000$). Moreover, the motivational goal influenced the time of

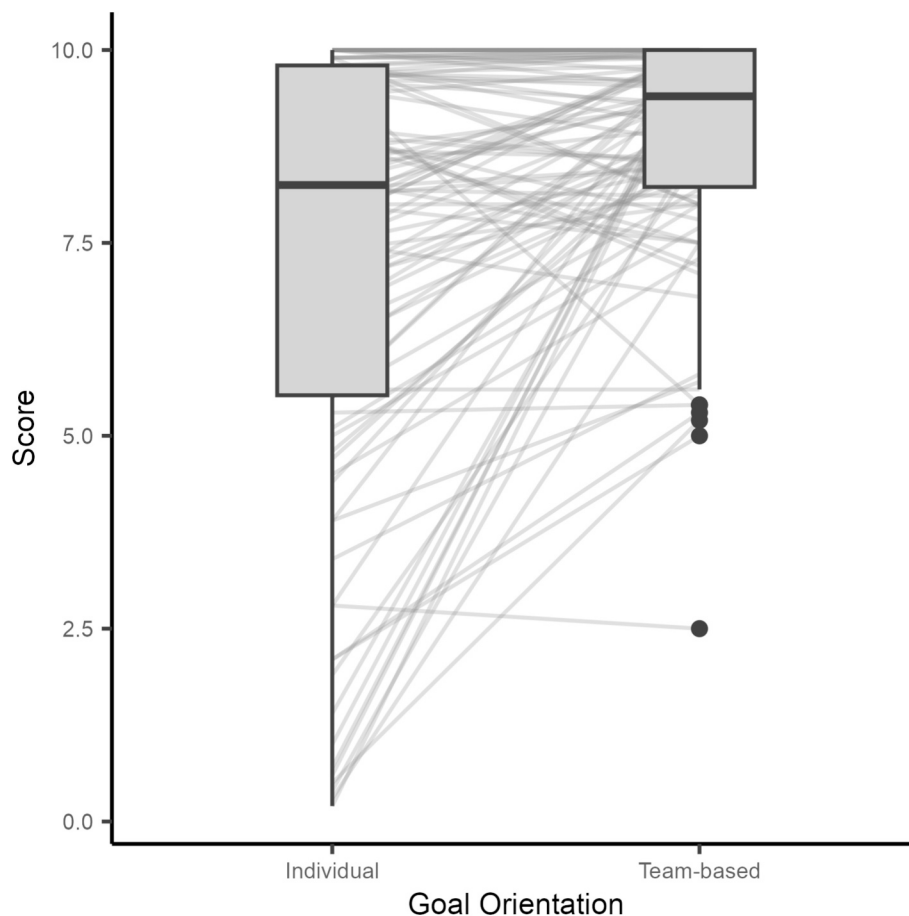


Fig. 2. Scores from the visual analogue scale obtained in the individual and team-based motivational goal conditions. A score of 10 represents a strong activation of the team identity whereas a score of 0 refers to the activation of the individual identity.

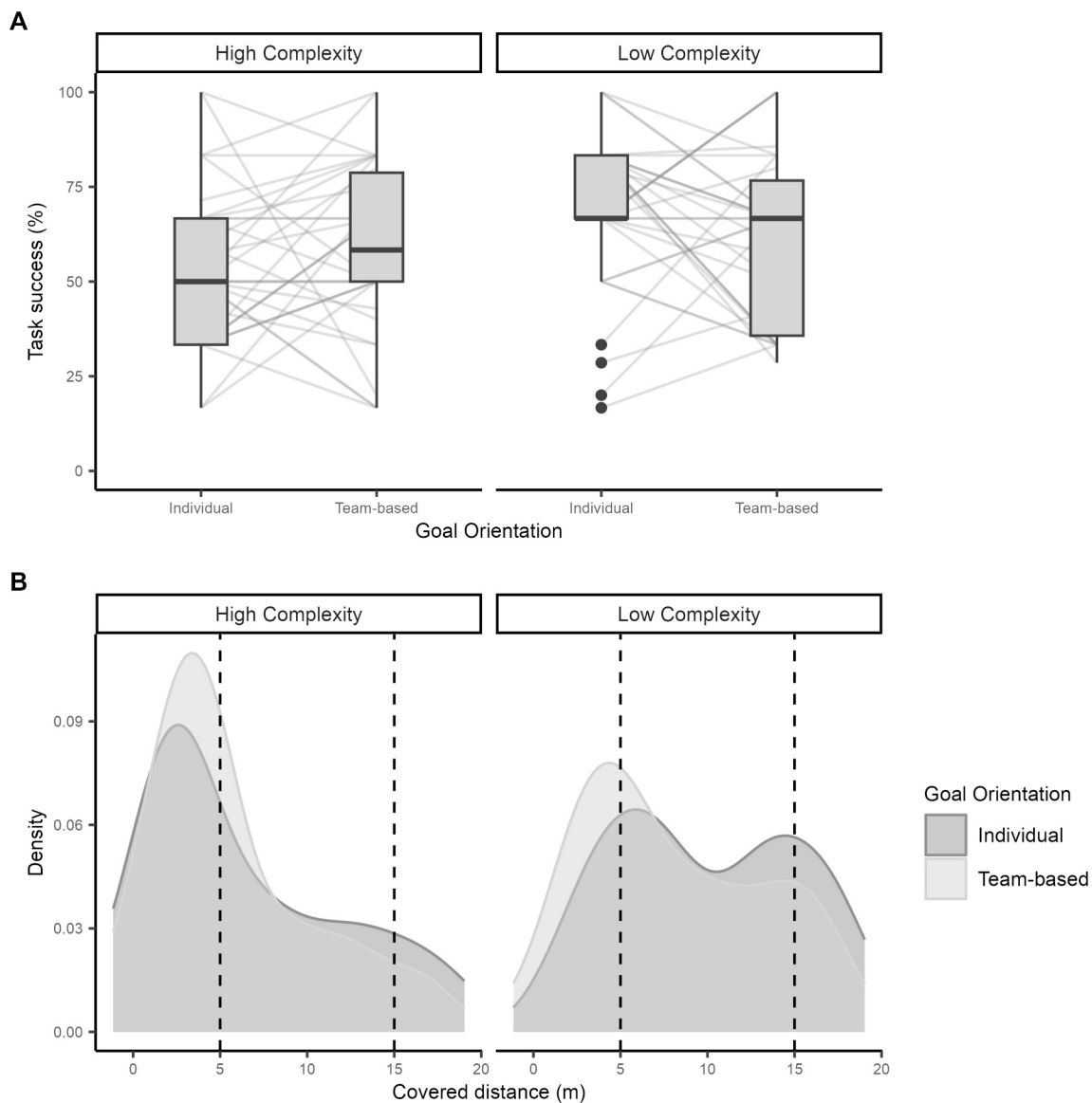


Fig. 3. Performance metrics in the two motivational goal conditions and the two tasks. (A) Percentage of trials ending with a try. (B) Longitudinal distance covered by the attacking team in trials not ending with a try. The areas represent the density of trials ending at different locations on the pitch. The vertical dotted lines show the starting position of the two defensive lines.

possession of the ball in LC ($p = .033$) with 0.12 s longer ball possession in TMG than in IMG but this difference was not significant in HC ($p = 1.000$). The time of possession of the ball was significantly 0.07 s longer in HC than LC [$F(1, 33) = 8.76, p = .006, \eta_p^2 = 0.210$]. The goal orientation significantly influenced the time of possession of the ball [$F(1, 33) = 6.64, p = .015, \eta_p^2 = 0.168$] with 0.07 s longer ball possession in TMG than IMG.

3.3.3. Pass length

The pass length was significantly influenced by the task complexity [$F(1, 29) = 206.47, p < .001, \eta_p^2 = 0.877$] with 3.5 m shorter passes in LC than HC. The goal orientation [$F(1, 29) = 1.96, p = .172, \eta_p^2 = 0.063$] and the interaction between the task complexity and the motivational goal [$F(1, 29) = 0.15, p = .702, \eta_p^2 = 0.005$] did not significantly influence the pass length.

3.3.4. Distance to closest defender

When passing the ball, the distance to the closest defender tended to be slightly longer in IMG than TMG [$F(1, 29) = 3.57, p = .069, \eta_p^2 =$

0.109]. The task complexity [$F(1, 29) = 0.37, p = .550, \eta_p^2 = 0.012$] and the interaction between these two factors [$F(1, 29) = 0.248, p = .623, \eta_p^2 = 0.008$] had no significant influence on this distance.

4. Discussion

The current study manipulated rugby players' goal orientation and task complexity (by setting two defensive situations) to investigate the influence of identity processes on in-game performance and decision making. Rugby game enabled to control the task constraints in which players were performing while being representative of rugby union game situations (Passos et al., 2008). We hypothesised that priming a team-based goal would benefit performance and that players' decision would differ between individual and team-based goal conditions only in the complex task of defence.

The manipulation of goal orientation proved effective, as players reported greater interest in team stakes when the team-based goal was highlighted compared to when the individual goal was highlighted. This finding suggests an impact on the players' level of self-abstraction,

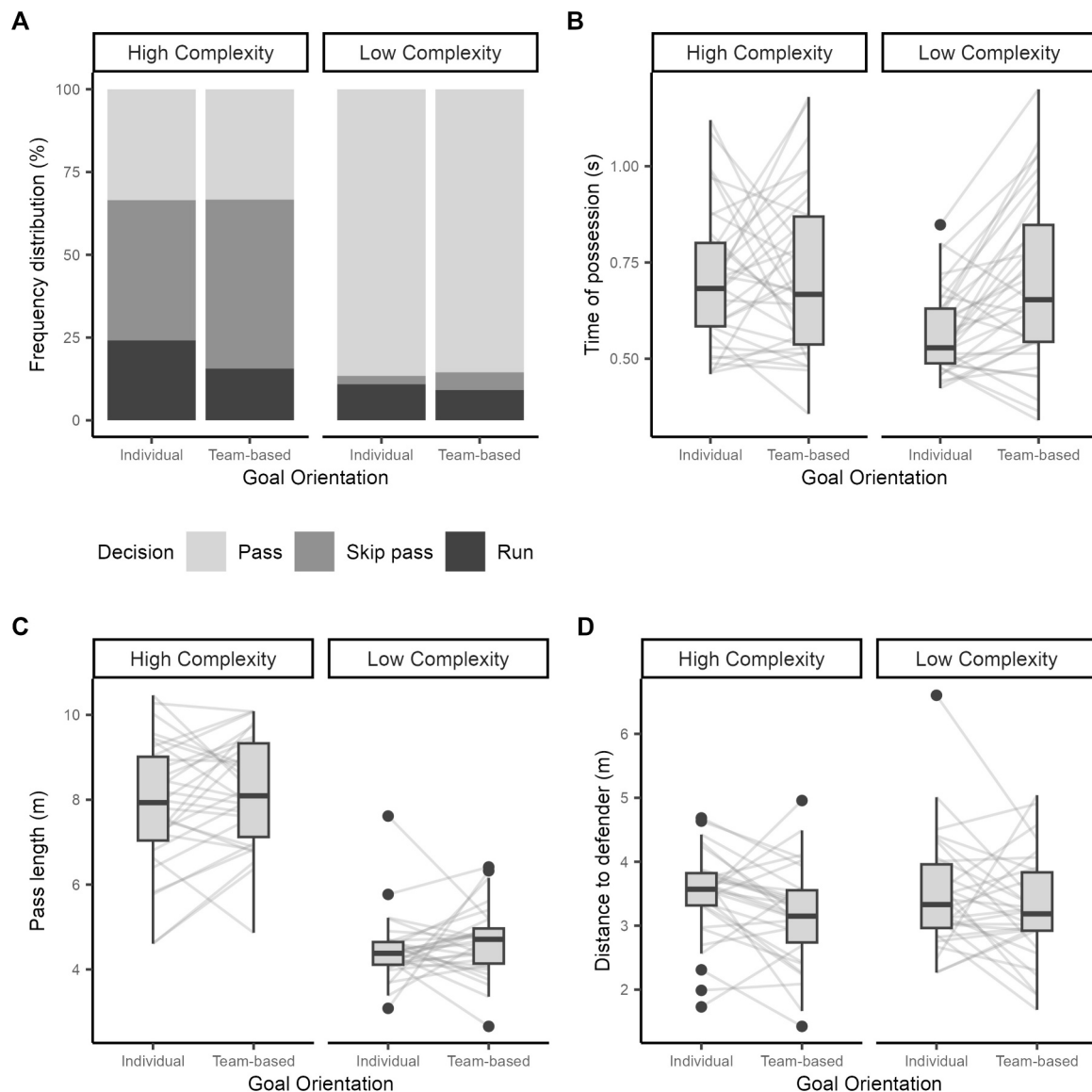


Fig. 4. Decision making of the first attacker in the two motivational goal conditions and the two tasks. (A) Frequency distribution of decisions. (B) Time of possession of the ball. (C) Length of the pass. (D) Distance from the closest defender at the time of the pass.

ultimately influencing their social identity (Campo et al., 2019; Oyserman et al., 2007; Oyserman & Lee, 2008; Tamminen et al., 2016). However, the mean score reported on the visual analogue scale remained high in both conditions, suggesting that even when the players were encouraged to pursue an individual goal they still identify more as a team member than as an individual. These results suggest that young elite rugby players share a strong “sense of we” (Fransen et al., 2022) that is easily reinforced with a team-based goal. On the contrary, decreasing this high level of self-abstraction with an individual motivational goal appeared more difficult given the high variability of response in this condition. Campo et al. (2019) reported a higher difference between their identity conditions. This may be attributed to the scenario involving the selection of rugby players for a championship game, which likely emphasized individual stakes more significantly than being selected for a training camp. Thus, in contrast to Campo et al.’s works (2019), the results of the current study reflect a comparison between high and low levels of team identification rather than a comparison between a personal and a social identity level. A perspective for future research could be to treat goal orientation as a continuous variable, using, for instance, participants’ scores on the visual analogue

scale, but such a design would require a larger number of trials per participant, which could prove difficult to implement.

Conversely to previous findings (e.g., Campo et al., 2019; Slater et al., 2019) and to our hypotheses, task performance was better in the individual goal condition. This indicates that the lower the player’s team identification, the better their performance. Indeed, the distributions of the final longitudinal position on the pitch (Fig. 3B) showed that teams were more successful in crossing the first defensive line in both high and low complexity situation when they were encouraged to pursue an individual goal. However, performance in this condition also appeared to be modulated by task complexity, as the frequency of tries decreased when confronted to the complex game situation. This effect suggests that pursuing individual goals may primarily enhance performance in simple tasks in rugby.

Results supported our hypothesis that team identification would modulate decision making. More specifically, players tried more often to cross the first line of defence alone and less to perform the skip pass when individual goal was promoted. These results support that priming an individual goal focuses players’ attention on opportunities for action in their close space whereas when priming a team-based goal, players

appeared more responsive to the teammates' opportunities for action (Weichold & Thonhauser, 2020). Thus, orienting goals towards team interests appears to support the sharing of affordances between teammates, as hypothesised by Silva et al. (2013). However, in the context of our task, and contrary to Silva et al. (2013) expectations, sharing a team-based goal did not support a more effective team coordination given the lower task performance in this condition. It should be stressed that these results are specific to the designed small-sided task used in the present study, which in the two situations presented a level of complexity much lower than what can be observed in 15-a-side rugby game situations. Being more responsive to the teammates opportunities for action might be more effective to solve real game situations (Correia et al., 2012). Thus, future work should aim to experimentally investigate how players' goal orientation affects collective performance in tasks representative of real-game conditions, incorporating greater complexity and dynamic interactions to more accurately capture the specific demands of rugby.

In addition, priming an individual goal appears to modulate decision-making time (i.e., the time taken to pass the ball after receiving it) based on task complexity. Players decreased the time of possession before passing in less complex game situations compared to more complex ones. These results shows that players make their decision to pass more rapidly in less complex game situations. These results also appear to be related to the observed changes in task outcomes between the two conditions of task complexity when the individual goal was primed.

A possible explanation for these findings is that priming an individual goal encourages players to avoid unnecessary risks and to quickly perform actions that align with the expectations of others, such as coaches and teammates, particularly in less complex tasks (Weichold & Thonhauser, 2020). This behaviour suggests that there is reduced interference between the team's expectations and the player's afforded behaviours in simpler situations. From a theoretical perspective, this can be understood through the lens of Identity-Based Motivation theory, which predicts that individuals are more likely to act in identity-congruent ways, as the activated identity in the context cues readiness to act in ways that fulfil their needs for competence and relatedness in accordance with their social identity (Oyserman, 2015). In less complex tasks, the alignment of individual goals with team expectations likely enhances a player's sense of competence and facilitates social approval (Amiot et al., 2014), thus promoting more efficient decision-making and performance. However, interpersonal distance to the closest opponent was not significantly affected by the interaction between the primed goal and the task complexity, which does not comfort that ball carrier took less risk before passing in the individual goal condition. This could be verified in the future with a more accurate tracking system to determine the players' positions and measure interpersonal distances during the small-sided games. Indeed, the use of a wearable GPS system was primarily motivated by the need to have a tracking system that could be transported and used at the club facilities. However, other tracking systems, such as optical tracking or LPS systems, may be more suitable for measuring interpersonal distances (Torres-Ronda et al., 2022), but would require the participant to be invited to a single location, which may make it difficult to involve a large number of elite athletes. Thus, these new technologies should offer an opportunity to overcome some of the limitations of GPS systems. This will enable future research to investigate the relationship between risky behaviour and goal orientation, and to further explore how our social environment shapes our field of affordances.

5. Conclusion

By priming individual or team-based goal, the current study experimentally manipulated athletes' level of self-abstraction to capture the influence of identity processes on performance and decision-making behaviour in a dynamic task, representative of a rugby-game situation. In contrast to previous studies, decreasing players' social identification

with an individual goal appeared to improve collective performance. It also appeared to influence how responsive players were to social affordances, providing interesting results on the interplay between what the environment invites players to do and how they modulate these invitations according to their current intentions. This study opens up the possibility of further research into the influence of the social environment on the selection of affordances, which could help coaches and managers optimize their interventions and promote team performance.

IRB approval

The protocol was approved by the CERSTAPS [IRB00012476-2022-20-01-147].

CRediT authorship contribution statement

Guillaume Hacques: Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Conceptualization. **Quentin Bourgeois:** Writing – review & editing, Methodology, Investigation, Formal analysis, Conceptualization. **Mickaël Campo:** Writing – review & editing, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Conceptualization. **Ludovic Seifert:** Writing – review & editing, Supervision, Resources, Project administration, Methodology, Investigation, Conceptualization.

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Declaration of competing interest

The authors have no potential conflict of interest to declare.

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Data availability

The dataset used in this study is openly available in an OSF repository at <https://osf.io/24br7/>.

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