SPRINT SPECIFICITY FOR RUGBY AND SOCCER PLAYERS

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INTRODUCTION: It is well accepted that speed is a crucial factor for success in both rugby and soccer. It is less clear how to narrow down a definition of speed so that we are actually measuring the ability that is needed in a game situation. The principle of specificity indicates that the sprints that are used for training/diagnosis should mimic those that occur in a game situation.

Brown (1999) reported that rugby players perform intensive efforts from 5 to 45 seconds in duration. It is not clear from this article what percentage of those efforts are sprints. Presumably some of the longer efforts would include scrummage, rucks and mauls. Docherty et al. (1988) examined results of a time analysis of international rugby games and reported that props average 22 sprints of 1.75 seconds and centers average 37 sprints of 2.3 seconds. In these times a player can travel from between 10 and 20 meters.

It is clear that these shorts sprints are accelerations that do not reach the top speed of the athletes. It is common knowledge that sprinters reach their top speed well after 30 meters (Mero et al. 1992).

If the distances covered by the players in a rugby game are typically under 30 meters than it is not ultimate maximum running speed of a rugby player that seems to be the critical factor, but rather acceleration, or maximum speeds at various short distances.

Sayer (2000) reported that sprints performed during field sports are rarely over more than 30 meters and that most of the time players are covering less than 10 meters at a time.

The analysis of rugby and soccer specific sprinting should take these factors into consideration. In addition to the distances, another important factor is direction.

It has been reported (Gerisch et al. 1988) that in soccer linear sprints of up to 40 meters occur as well as non linear short sprints with turns of up to 180 degrees. Casual observation would indicate that nonlinear sprints also occur regularly during rugby games.

It has also been reported (Frick et al. 1992) that sprint speed in soccer is typically tested using linear sprints between 10-40 meters. It was not clear to the authors of this paper how rugby speed is typically tested. References to both linear sprint testing and nonlinear sprint testing were found (Noakes and DuPlessis, 1996).

One reason for the occurrence of nonlinear sprints in rugby and soccer is that in both rugby and soccer there are opponents from the other team that have to be avoided on the way towards the goal. To do this effectively the athlete needs the ability to either run extremely fast in a relatively straight line to run past the opposing player or to be able to change direction quickly and outmaneuver the opposing player. The ability to change directions quickly may not be the same ability as that of accelerating quickly in a straight line or that of achieving a high maximum speed.

Therefore purpose of this study was to:

Develop nonlinear tests that include various cutting moves.

To test rugby and soccer players over linear sprints and nonlinear sprints to see if the ability to accelerate over linear distances correlates well with the ability to perform directional changes quickly.

METHODS: Forty eight subjects, 17 Female intercollegiate soccer players and 31 male university club rugby players volunteered to participate in this study. Before testing began subjects were explained the risks of participation and signed an informed consent form in compliance with the rules of the Miami University Human Subjects Board.

Testing of the soccer players was performed on the soccer field, testing of the rugby players took place on the rugby field. The tests were developed using feedback from the coaches and also from reviewing the literature. For the soccer players 3 tests were analyzed: a linear sprint of 40 meters, a course shaped like an 'L' in which the athletes had to complete both 90 and 180 degree turns during the sprint (see Figure #1a), and a zig zag course (see Figure #1b). The sprints that were analyzed for the rugby players were: the first 10 meters of a 30 meter dash, the last 20 meters of a 30 meter dash, and a with both 90 and 180 degree turns similar to the course used by soccer players. Players completed the sprints without the ball. Sprint times of the athletes were measured using timing gates (model: 63501 IR manufactured by Lafayette Instruments). Statistical analysis was performed using SPSS for windows (Version 12, Chicago Il). Correlation analysis was performed to determine reliability of the individual sprint tests and also to compare results of the various sprint tests.

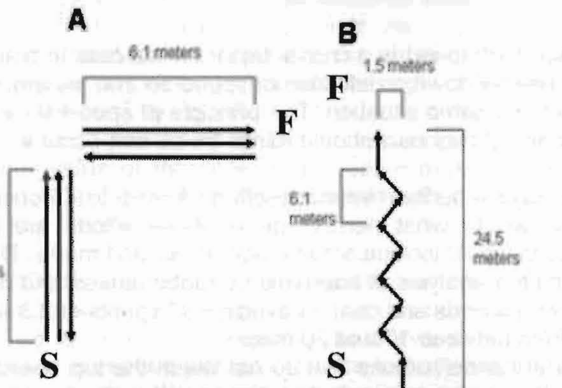

Figure 1 Diagrams of the non linear sprint tests performed by the soccer players. The start of each course is marked bv a 'S'

RESULTS AND DISCUSSION: The correlation measures show varying repeatability depending on the specific sprint. For the sprints that the rugby players performed the correlations between the test and retests for the 10 meter start, the flying 20 meter sprint and the L course were: r = .884 (p,0.000), r = .934 (p < 0.000), r = .662 (p,0.006) respectively. For the sprints that the soccer players performed the correlations for the 40 meter sprint, the zig zag course and the L course were: r = .972 (p < 0.000), r = .665 (p < 0.004), r = .855 (p<0.000) respectively. One thing the results indicate is that performance during linear sprints seems to be more repeatable than that of nonlinear sprints. One explanation for this might be that during linear sprints the athlete chooses a stride length and rate that is probably near optimal for the given test. For the non linear tests the athlete must alter his/her stride pattern to changes directions at specific points during the test. These adjustments are probably not planned but are probably spontaneous and occur sometime just before the actual directional change.

The correlation between the performances during the various sprints was low (see Table 1). This seems to be partially due to the lack of reproducibility of the performances during the nonlinear sprints. This lack of test retest reliability makes correlations difficult because even performances from the same test don't correlate well. In light of this difficulty there seems to be a difference between the ability to sprint in a straight line and the ability to change directions quickly. This is indicated by the very low correlations between the performances of the linear and nonlinear sprints of both soccer and rugby players (see Figure 2).

Table 1 Correlations (r and p values) between the different sprints performed by soccer and rugby players.

	Soccer players				Rugby Players	
	40	L course			10	Flying 20
Zig Zag	.451 (p<0.070)	.043 (p<0.885)		T course	.203 (p<0.405)	.279 (p<0.179)
L course	.288 (p<00.319)			Flying 20	.479 (p<0.032)	

CONCLUSION: Since the ability to run fast in a straight line does not seem to be the same as the ability as perform cutting moves it seems that for both training and diagnosis of soccer and rugby specific sprinting both linear and non linear sprint tests should be used. With regard to Wolf's law this seems reasonable with regard to training. But, for purposes of evaluation of performance there may be limits to the degree of specificity used. The difficulty demonstrated by this study is the reliability of nonlinear sprint testing. A potentially greater problem arises when you perform game specific sprinting with the ball. For instance the nonlinear rugby sprint testing mentioned by Noakes and DuPlessis (1996) included directional changes and catching and throwing a rugby ball.
During a game players pass and catch the ball while running. This type of test is hard to use as a diagnostic tool because the performance of the athlete is not only dependent of his or her ability but also on that of the person throwing the ball to the athlete and therefore may be measuring something other than the ability of the tested player. A similar problem is also present in diagnostic testing of soccer sprints.

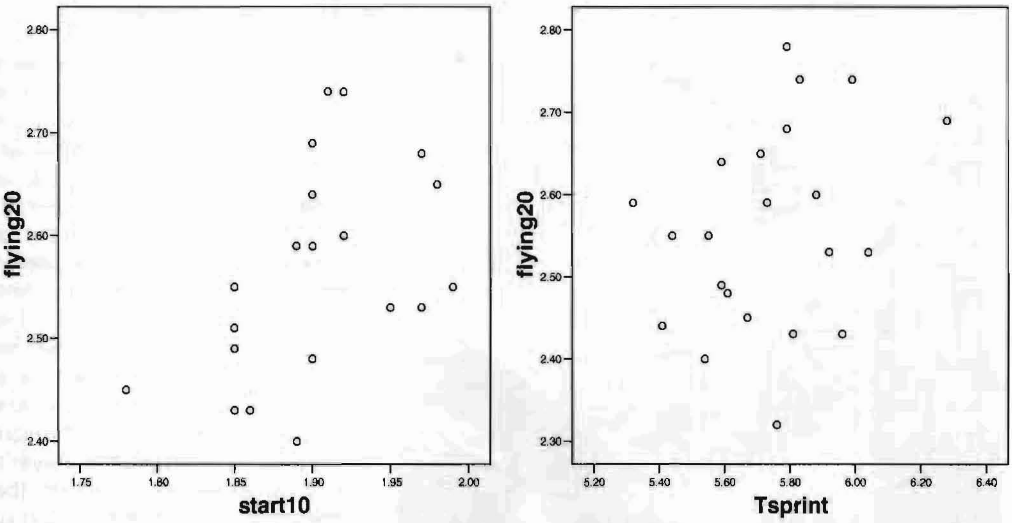

Figure 2 Scatterplots comparing the rugby player's performances for the 10 meter sprint, the flying 20 and the T sprint.

REFERENCES:
Brown, D. (2000). Tackling sports specific training. *Rugby Special Ultrafit.* 50, 70-73.
Docherty, D., Wenger, A., Neary, P. (1988). Time-motion analysis related to the physiological demands of rugby. *Journal of Human Movement Studies.* 14, 260-277.
Frick, U., Fichte, R., Schmidtbleicher, D., Stutz, R., Willing, A. „Sportspezifische Schnelligkeitsdiagnose". In Brack, R., Hohmann, A., Wieland, H. (Hrsg.): Sportwissenschaft and praxis; Band 6.(Trainingssteuerung – konzeptuelle und Trainingsmethodische Aspekte). Naglschmid, Stuttgart 1992, 226-271.
Mero, A. Komi, P., Gregor, RJ. (1992). Biomechanics of sprint running. *Sports Med* 13:376-392.
Noakes, T., Du Plessis, M. (1996). Rugby without risk. J.L. van Shaik Publishers. Pretoria, South Africa.
Potthast, W., Kersting, U., Brueggemann, G.-P. (2001). Mechanical load in soccer specific sprints. Conference proceedings of the 6^{th} annual congress of the European College of Sports Science. P. 559.
Sayers, M. (2000). Running techniques for field sports players. *Sports Coach.* 23, 26-27.