Playing Demands of Sevens Rugby during the 2005 Rugby World Cup Sevens Tournament.

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Abstract

Sevens rugby is an expanding sport with over 30 nations participating in the IRB Sevens Series and the 2005 Sevens World Cup. This study aims i) to provide an outline of the playing demands of Sevens rugby and ii) to determine whether there are any tactical differences in the teams that reached the semi-finals vs. the quarterfinalists. Recordings of the matches (n = 47) played during the 2005 World Cup were analysed. Mean playing play time was 7min 18s ± 27s. Mean time accumulated during point scoring movements per match was 97.8 ± 26.1s group, 75.8 ± 10.9s quarterfinalists and 119.8 ± 13.0s semi-finalists; this difference was significant (P=0.05). In summary the ball was in play for 52% of match time and each team had possession for 28% of match time. There was a significant increase in the amount of time required for point scoring movements (20.8 ± 2.3s) compared to turnover movements (12.8 ± 2.3s). For a team to reach the semi-finals or finals of the 2005 Sevens Rugby World Cup Tournament, they had to be able to maintain possession for periods of between 30 and 60 seconds and convert over 30% of those possessions into point scoring movements.

Keywords: Sevens Rugby, World Cup, Game analysis

1. Introduction

Sevens rugby has developed since its beginnings in Scotland in 1883, from a social pastime into a very competitive sport with a regular season of international tournaments (Planet Rugby 2005). The International Rugby Board's (IRB) Sevens Series now runs from December to June the following year. A Sevens World Cup is also held every four years. The sport is continually expanding (Signes 1990) with over 30 nations now taking part in the IRB Sevens Series compared to the 16 (Planet Rugby 2005) who played in the first tournament during the 1999 - 2000 season. The format of the World Cup Sevens tournament has not changed since its inception in 1993; 24 nations from across the rugby world qualify for their place in the competition.

Current information pertaining to Sevens Rugby performance is presented by the IRB after each tournament and as a summary review at the end of the season. However, it is not a readily available resource. These data statistically describe various performance indicators that occurred during a tournament listed or series according to a decreasing

scale of the relative success of the particular teams. For example the mean ball in play time during the 2004/5 season was 6minutes 50s or 49% of match time and ranged from 48 – 50 % depending upon the tournament. New Zealand was the team with the highest rate of scoring in the 2004/5 season with only 41s between each try. The lowest rate of scoring for the teams that participated in all seven of the 2004/5 tournaments was Kenya with one try every 90s. The average possession per team during the 2004/5 season ranged from 4minutes 0s for England to 3 minutes 9s for Kenya (IRB 2005).

Information on the demands of Sevens rugby are limited to simple descriptions of the game. For example, it is described as: Non-stop action played by 14 players (seven per team) in 2 x 7 minute halves (Planet Rugby 2005); speed and athletic skills are required, with timing and agility having a greater emphasis on the outcome than the physical qualities of the 15-man game (Planet Rugby 2005); Sevens places a premium on speed of running, reactions and expert individual skills, there is no substitute for pace, speed of hand and strong tackling (Rugby7.com 2006).

In a study conducted by Rienzi et al. (1999), work rate profiles of international rugby sevens players were determined. Their data showed that the average duration of a match was 17 minutes and 44 seconds (± 2 min 33 s) which was broken down into 14 minutes 22 s of activity time and 3 minutes 23 s of static time. The activity time was classified into different movement categories. On average 6.3% (54 seconds) of activity time was spent at a high intensity. There were no significant differences between the observed frequency or percentage time of the different work rate data between winning and losing teams.

Despite the growth that this sport sport has seen over the last 10 years there remains a dearth of literature on Sevens rugby (IRB 2006, Rienzi et al 1999, Signes 1990). This study aims i) to provide a general outline of the playing demands of Sevens rugby and ii) to determine whether there are any clear differences in playing strategies for the teams that reached the semi finals vs. the quarterfinalists.

2. Methodology

Videotape recordings of the matches played by South Africa (n=6), Fiji (n=7), New Zealand (n=6), Australia (n=6), England (n=6), Argentina (n=5), Scotland (n=6) and France (n=5) during the Sevens World Cup 2005 were analysed retrospectively using digital analysis software. The duration for which each team held possession (a period of play until possession changed excluding the time the ball was out of play) was recorded for each movement and then categorized according to whether; (i) points were scored, (ii) a turnover resulted. The duration of the point scoring movements were divided up into 5 second intervals across the 0 – 90 second range of movement durations. The repeatability of the technique used in this study was previously reported in van Rooyen et al, (2006).

2.1. Statistics

The values were reported as both accumulated and mean scores for the whole group of 8 teams and then for the quarterfinalists (Argentina, France, Scotland and South Africa) and semi finalists (Australia, England, Fiji and New Zealand). The duration of the movements, both the accumulated and the mean data, were expressed as mean (±SD).

The frequency data were expressed by percentage to allow for inter-team comparisons. The data were divided according to whether the teams finished as semi finalists and above or and quarterfinalists. The data were further subdivided into point scoring or turnover categories. The data from the point scoring movements were only reported as both groups are dependant and sum to 100% of the play with ball in hand. The point scoring data were presented graphically to best illustrate how the frequency of the percentage accumulated data varied across the different movement time categories. The steeper the gradient between two points the greater the frequency of data observed. Significant differences were determined using a two tailed t-test.

3. Results

The mean playing time for each match was 7min 18s ± 27s for the group of eight teams. The mean time for the quarterfinalists was 7min 13s ± 28s and for the semi-finalists was 7min 23s ± 29s; these data were not significantly different ($P>0.05$). The amount of time the teams were in possession of the ball per match was 3min 55s ± 22s for the whole group. The quarterfinalists and semi-finalists maintained possession for 3min 46s ± 23s and 4min 7s ± 20s respectively, again the data were not significantly different ($P>0.05$). The data for the three groups are shown in table 1. The amount of time in possession of the ball per movement was 16.0s ±1.8s for the whole group. There was no significant difference between the amount of time in possession per movement between the quarterfinalists (16.4s± 2.4s) and the semi-finalists (15.6s ±1.0s) $P>0.05$).

The mean time accumulated throughout a match for movements or possessions that resulted in points being scored was 97.8s ± 26.1s for the whole group. The semi-finalists accumulated significantly more time for point scoring movements during a match (119.8s ± 13.0s) than did the quarterfinalists (75.8s ± 10.9s) ($P=0.02$). The mean time per possession for each point scoring movement was 20.8s ± 2.3s for the whole group and 19.6s ± 2.3s and 22.1s ± 1.6s for the quarterfinalists and the semi-finalists respectively; these were not significantly different ($P>0.05$).

The mean time that accumulated during a match for the movements that resulted in turnovers were 141.1s ± 22.7s, 150.9s ± 23.8s and 131.4s ± 19.5s for the whole group, the quarterfinalists and the semi-finalists respectively. The mean movement time per possession for plays that resulted in turnovers were 12.8s ± 2.3s for the whole group and 14.1s ± 2.2s for the quarterfinalists and 11.6s ± 1.8s for the semi-finalists. A comparison between the mean time for point scoring movements and movements that resulted in turnovers shows that significantly more time is required per movement when points are scored (20.8s ± 2.3s) than when possession is lost (12.8s ± 2.3s) ($P<0.05$). The data also shows that points are scored every 55.7s ± 12s of possession for the whole group or every 63.7s ± 11s of possession for the quarterfinalists or every 47.8s ± 9s of possession for the semi-finalists. This difference between quarterfinalists and semi-finalists was not significant ($P>0.05$).

When the data were expressed according to the opposition played (whole tournament opposition or opposition from only the final pool games and knock-out stages), significant differences were found for the quarterfinalists (table 1 & 2).

Table 1. Durations of different playing events during the 2005 Sevens Rugby World Cup.

	Group (n=8)	Semi finalists (n=4)	Quarter finalists (n=4)
Mean Playing time (min s)	7 min 18 s (± 27s)	7 min 23 s (± 29s)	7 min 13 s (± 28s)
Mean Duration of time in possession (min s)	3 min 55 s (± 22s)	4 min 7 s (± 20s)	3 min 46 s (± 23s)
Mean Duration of movement per possession (s)	16.0 s (± 1.8s)	15.6 s (± 1.0s)	16.4 s (± 2.4s)
Mean Accumulated duration of point scoring movements (s)	97.8 s (± 26.1s)	119.8 s * (± 13.0s)	75.8 s * (± 10.9s)
Mean duration of point scoring movements (s)	20.8 s # (± 2.3s)	22.1 s (± 1.6s)	19.6 s (± 2.3s)
Mean Accumulated duration of turnover movements (s)	141.1 s (± 22.7s)	131.4 s (± 19.5s)	150.9 s (± 23.8s)
Mean duration of turnover movements (s)	12.8 s # (± 2.3s)	11.6 s (± 1.8s)	14.1 s (± 2.2s)
Mean time between Point scoring movements (s)	55.7 s (± 12s)	47.8 s (± 9s)	63.7 s (± 11s)
Average Number of Possessions for whole tournament	89.5 (115 - 76)	97.0 (115 - 88)	79.5 (92 - 76)

* indicates that there is a significant difference between the semi finalists and the quarterfinalists at P = 0.05.
# indicates that there is a significant difference between point scoring movements and movements that resulted in turnovers.

Table 2: The Duration of different playing events in the 2005 Sevens Rugby World Cup during the final pool matches and the knock-out stages of the tournament.

	Semi-finalists (n=4)	Quarterfinalists (n=4)
Mean Duration of time in possession (min s)	4 min 0 s (±35s)	3min 38 s (±16s)
Mean Duration of movement per possession (s)	16.4 s (±1.3s)	20.2 s (±6.1s)
Mean Accumulated duration of point scoring movements (s)	93.5 s* (±34.6s)	18.6 s* (±16.3s)
Mean duration of point scoring movements (s)	22.2 s* (±6.1s)	12.1 s* (±1.5s)
Mean Accumulated duration of turnover movements (s)	148.0 s* (±27.3s)	199.1 s* (±23.0s)
Mean duration of turnover movements (s)	13.6 s (±1.7s)	20.2 s (±7.2s)

* indicates that there is a significant difference between the semi finalists and the quarterfinalists at P = 0.05.

The accumulated duration of all point scoring movements decreased by 57.2 s (total data; 75.8 ± 10.9s vs. top 8 data; 18.6 ± 16.3s) when the quarterfinal teams played against any of the other top 8 teams. The mean duration of each point scoring movements also decreased (7.5s) when the performances against the top 8 teams was separated from the total data (12.1 ± 1.5s top 8 teams vs. 19.6 ± 2.3s total data). The total number of movements the quarterfinalists completed against their top 8 opposition decreased substantially compared to when they played in the earlier stages of the tournament. Normalised figures (table 3) show that the quarterfinalists converted 20% fewer of their possessions into point scoring movements when playing against top 8 opposition. This is a significant decrease from the earlier stages of the tournament and is substantially below the levels attained by the semi-finalists. The semi-finalists failed to convert only 8% fewer possessions into points when playing against top 8 opposition. The same but inverse trend is observed for the turnover data; there was a 20% increase in the number of turnovers when quarterfinalists played against the other top 8 teams. The average number of movements per match dropped by a median of 5 per match. However, the number of turnovers per match remined fairly constant despite the differing ability levels of the opposition (table 3). The number of point scoring movements dropped significantly, on average 4 point scoring movement per match, when the playing abilities of the opposing teams were more similar.

Table 3: A number of different playing events during the 2005 Sevens Rugby World Cup comparing the semi-finalist and quarterfinalists with their different opposition.

	Semi-finalists (n=4)		**Quarterfinalists (n=4)**	
	Vs teams below top 8 (n=14)	Vs teams in top 8 (n=11)	Vs teams below top 8 (n=15)	Vs teams in top 8 (n=7)
Total number of movements	231	166	241	78
Total number of point scoring movements	84 (36%)	47 (28%)	72 (30%)	8 (10%)
Total number of turnover movements	147 (64%)	119 (72%)	169 (70%)	70 (90%)
Average number of movements per match	16.5 (13 - 19)	15.0 (10 - 19)	16.0 (12 - 20)	12.0 (7 – 14)
Average number of point scoring movements per match	6.5 (2 – 8)	4.0 (1 – 8)	5.0 (2 - 8)	1.0 (0 - 2)
Average number of turnover movements per match	11.0 (9 - 12)	11.0 (5 - 15)	10.0 (8 - 17)	10.0 (7 - 13)
Ratio Point scoring movements: turnovers	1:1.8	1:2.5	1:2.4	1:9.1

The mean number of possessions for each team for the entire tournament was 90.0 (range 115 – 76). The quarterfinalists achieved 79.5 (range 92 – 76) and the semi-finalists 97.0 (range 115 – 88) possessions per tournament. These figures equate to 15.0 (range 7 – 20) possessions per match for the whole group, and 16.0 (range 10 – 19) and 14.0 (range 7 – 20) for the quarter and semi finalists respectively; this difference

between the semi-finalists and the quarterfinalists was not significant (P>0.05). The number of possessions that resulted in points being scored in the tournament for the whole group was 26.0 (range 18 - 38), for the quarterfinalists 18.0 (range 18 – 27) and for the semi-finalists 34.0 (range 25 – 38). There was a significant difference between the quarterfinalists and the semi-finalists for the number of point scoring possessions accumulated during the tournament (P=0.01). The equivalent values per match are; 5.0 (range0 – 8) point scoring possessions for the whole group, 3.5 (range 0 – 8) for the quarterfinalists and 5.0 (range 1-8) for the semi-finalists. Once again there was a significantly higher number of point scoring possessions per match for the semi-finalists than for the quarterfinalists (P=0.02). These figures show that for every possession that resulted in points being scored there were 3.6 ±0.7 possessions that resulted in turnovers. The quarterfinalists had a greater number of turnovers to point scoring movements (4.1 ± 0.6:1) when compared to the semi-finalists (3.1± 0.4:1).

The frequency data was expressed as the cumulative percentage of point scoring movements (figure 1). This means that the % frequency of point scoring movements from the previous movement category was added to the % frequency value of the next category and so on until the sum of all movement category data was presented. This figure shows that 50% of all scoring movements last less than 20 seconds, 75% less than 30 s and 100% for all teams except Fiji, less than 60 s. Only Fiji scored points after being in possession for longer than 1 minute. There was also a threshold for each team at which the probability of a point scoring play decreased as the duration of the movement increased. This was found to be between the 20 and 35 second duration category (figure 1).

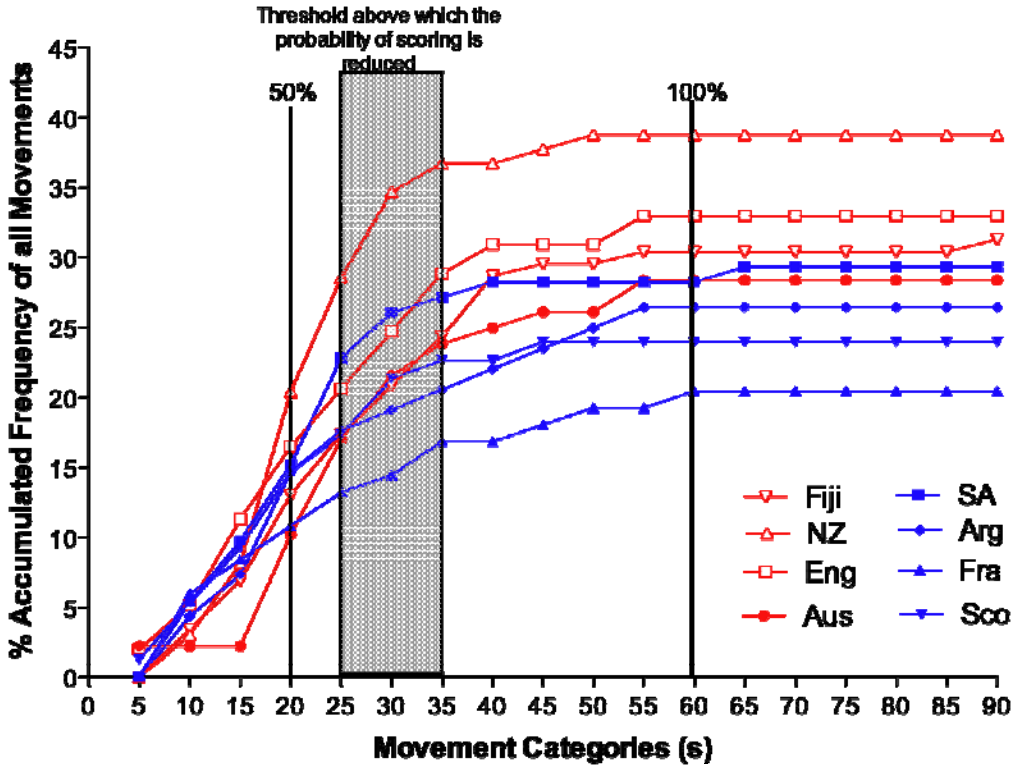

Figure 1. Accumulated % frequency data for the point scoring movements for all of the eight teams during the 2005 Sevens World Cup. 50% marker indicates that 50% of all

point scoring movements were less than 20 seconds. The 100% marker indicates the maximum duration of point scoring movements.

The data also shows a large spread across the eight teams. When the data are expressed as the means for the group data, the semi finalists and the quarterfinalists, additional patterns emerge (figure 2). The mean data for the whole group shows that 29% of all movements are converted into point scoring movements (figure 2). The semi finalists convert a significantly higher percentage of their movements into points (32.9 %) compared with only 25.1% of all movements for the quarterfinalists (figure 2) (P>0.05). The cumulative curves are significantly different from each other from the 40-second movement category onwards (P>0.10) (figure 3). The gradient of each line reduces after a threshold value, in the case of the semi finalists this threshold values was 30 seconds and was 25 seconds for the quarterfinalists (figure 2 & 3).

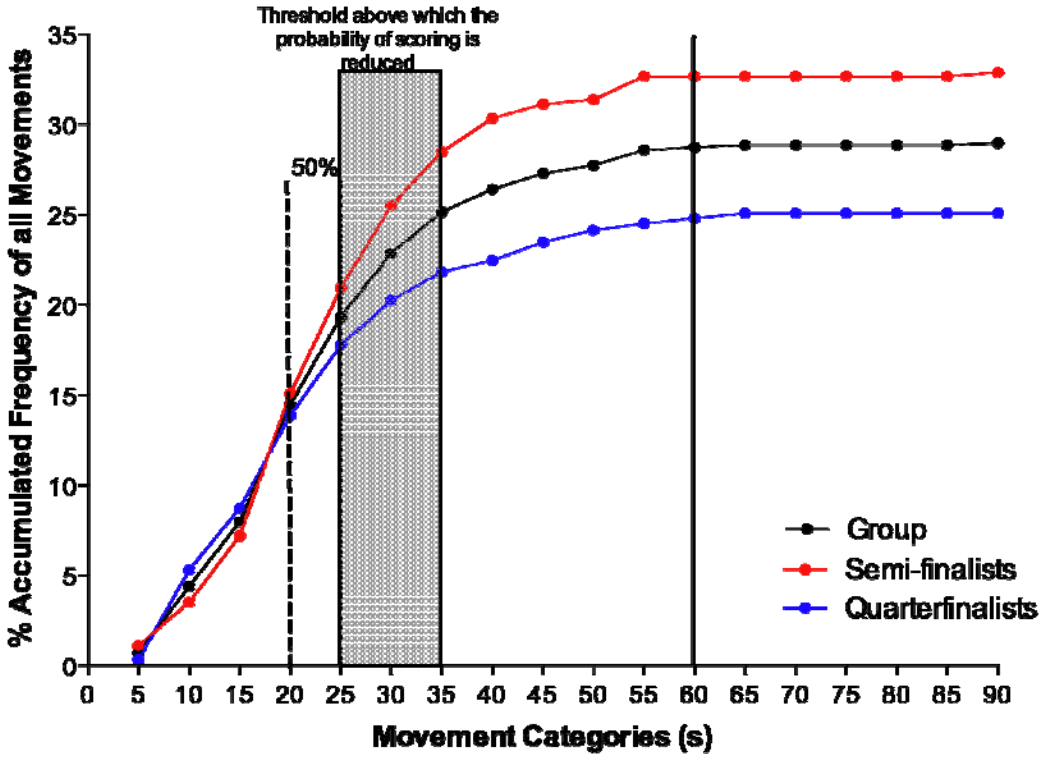

Figure 2. Accumulated % frequency data for the point scoring movements for the whole group, the semi-finalists and the quarterfinalists during the 2005 Sevens World Cup. 50% marker indicates that 50% of all point scoring movements were less than 20 seconds for the quarterfinalists and less than 25 seconds for the semi-finalists. The 100% marker indicates the maximum duration of point scoring movements.

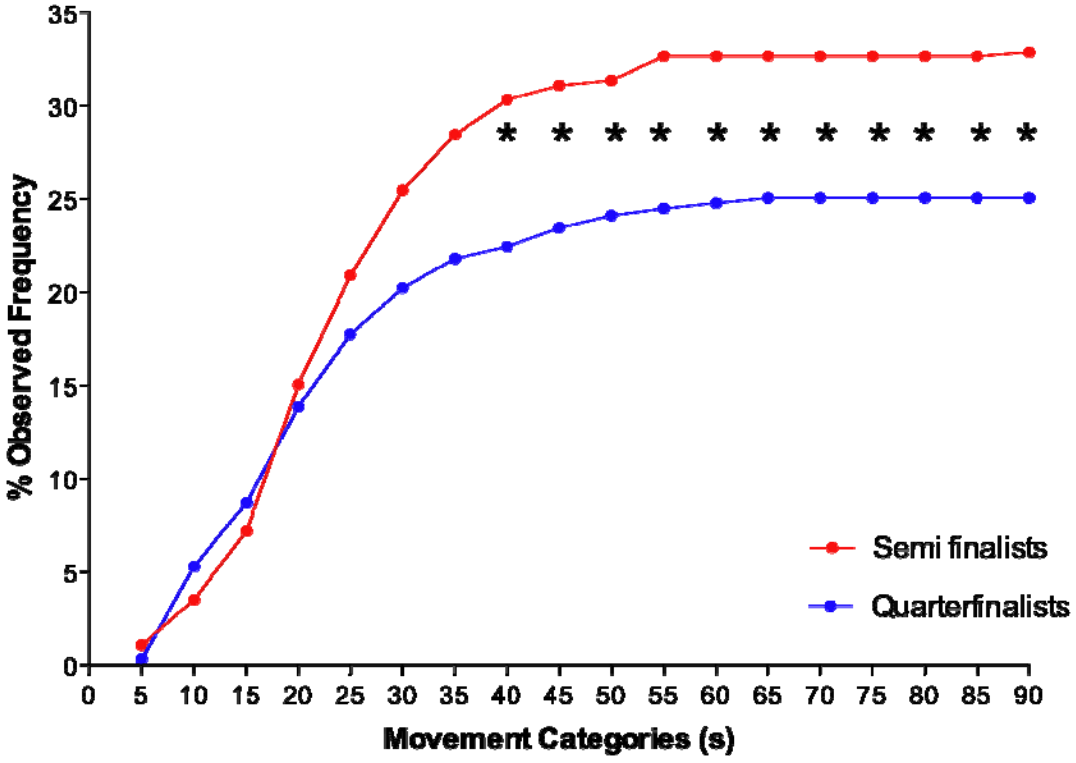

Figure 3. Accumulated % frequency data for the point scoring movements for the semi-finalists and the quarterfinalists during the 2005 Sevens World Cup. The semi-finalists score more frequently than the quarterfinalists with movements lasting longer than 30 seconds.

* indicates that there are significant differences between the semi finalists and the quarterfinalists (P>0.10).

4. Discussion

The data from this study of the top 8 teams during the Sevens Rugby Union World Cup 2005 is similar to the findings of the IRB tournament series 2004/5. This study found that on average the ball was in play for 7min 18s, which equates to 52% of match time. The IRB (2005) documents that the average ball in play-time for 2004/5 was 6min 50s or 49% of match time, with individual tournaments ball in play-time ranging from 48 to 50% of match time. The 3% difference between the World Cup values and the IRB series values could simply be due to the analysis of the World Cup data being restricted to the top eight teams whereas the IRB data reflected all the series participants.

The mean time in possession of the ball per team was 3min 55s or 28% of match time and falls within the range of 4min 0s or 29% match time for England and 3min 9s or 23% match time for Kenya (IRB 2005). An additional similarity between this study and the IRB report 2005 was the time between point scoring movements. For this study point scoring movements were on average separated by 55.7s and the IRB reported a range of data from 41s for New Zealand to 90s for Kenya (IRB 2005).

The amount of time that a team accumulates per match for point scoring movements accounted for 97.8s or 41% of the total time in possession of the ball. This indicates that almost 60% (141.1 ± 2.2s) of possession time per match, results with the ball being lost to the opposition. When these figures are expressed by their frequency of occurrence, they show that for every point scoring movement there are 3.6 movements that result in turnovers. The frequency data (figure 2) show that approximately 30% of the movements result in points being scored. These figures can be reconciled since the mean movement time for point scoring movement (20.8 ± 2.3s) was significantly longer than when possession was lost (12.8 ± 2.3s). This difference in the duration of point scoring movements and those that result in turnovers has also been observed in our studies of the 2003 15-man Rugby World Cup (van Rooyen et al. 2006; van Rooyen & Noakes 2006).

The performance of the semi-finalists differed from that of the quarterfinalists in several ways (table 1). The ability of the semi-finalists to accumulate possession during a match was superior to that of the quarterfinalists and the rate at which this possession was converted into points was significantly faster for the semi-finalists (table 1 and figures 2 & 3). These differences were further emphasised when the playing ability of the opposition was taken into account (tables 2 & 3). Thus matches played against teams who finished outside the top 8 were played in the earlier stages of the tournament whereas the matches against the top 8 teams were played either in the final group matches or in the knockout stage of the tournament.

Both quarterfinalists and semi-finalists maintained the same levels of possession when playing the higher ranked teams. However, the frequency with which possession was converted into points dropped for both teams. This reduction in accumulated point scoring movements per match was far greater for the quarterfinalists both in terms of time (table 2) and frequency (table3) and resulted in only 8.5% possession and 10% of movements being converted to points. Thus we conclude that the ability to maintain possession leading to point scoring movements, especially during the knockout stages of this Sevens Rugby World Cup tournament, appears to be the most obvious difference between the semi-finalists and the quarterfinalists.

In summary this study found playing time of matches during the 2005 Sevens Rugby World Cup tournament to be 7minutes 18seconds. Of this total playing time each team maintained possession of the ball for 3minutes 55seconds or 28% of the match. These findings are consistent with data produced by the International Rugby Board (2005). The performance of the semi-finalists and the quarterfinalists differed significantly with regard to the frequency of point scoring movements and the amount of possession that is converted into points. This disparity is accentuated as the ability of the opposition increases.

Therefore to reach the semi-finals or finals of the 2005 Sevens Rugby World Cup Tournament, a team had to be able to secure and maintain control of the ball for periods of possession of between 30 and 60 seconds and convert over 30% of those possessions into point scoring movements.

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