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Flow State and Performance Patterns in Tennis Competition

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Abstract

Flow experiences have important implications for performances in both sport and everyday life. Several studies have shown correlational links between flow and subjective performance assessments, and flow and objective performance outcomes. One limitation of previous investigations was the overall assessment of flow state, measuring flow retrospectively after the end of the training or competition performance. In this study, flow was measured repeatedly during a two-set tennis-training match. Participants reported on their flow state during the frequent match breaks when changing ends. The purpose of the present study was to examine the relationship between flow and performance outcomes. Results revealed similar patterns between flow and performance measurements. The conclusion drawn is that there is a positive association between flow state and performance; that is stronger flow experiences are linked to better performances.

Keywords: Flow, Performance, On-Court Measurement, Junior Tennis

Introduction

One of the main reasons people participate in sports is the subjective experiences associated with these activities Jackson and Csikszentmihalyi [1]. Positive subjective experience and well-being can arise from enjoyment and successful performance in sport, in terms of winning or performing well. Being in flow is indirectly related to performing well, which can be considered as a consequence of the flow experience and is deemed to provide the impetus for individuals to develop new potentialities Young [2]. Thus, understanding the relationship between flow and performance is important for coaches and researchers to increase the experience of athletes' flow state and performance in tennis.

The flow-performance relationship has been examined in several studies investigating the connection between flow and subjective performance assessments, and between flow and objective performance outcomes Stavrou and Zervas [3]. A limitation of these previous studies was the use of a retrospective design. Applying the scales following completion of the competition provides little information on the flow-performance relationship and does not account for temporary, event-specific changes in flow and performance, and how both variables interact. In order to overcome methodological limitations of previous studies, participants in this study completed a short form of flow state during change of ends. The purpose of this study was to investigate the relationship between flow state and performance during a two-set tennis-training match.

Methods

Participants

Two ranked junior players with 6.5 and 5 years of tennis and competition experience participated. Both players had a ranking position and played between 16 and 20 tournaments per year.

Measures

A nine-item short form of the FSS-2 was employed Jackson [4]. Participants reflected on their flow state within 60 seconds when changing ends. The response format was a 5-point Likert (1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree nor disagree*, 4 = *agree*, 5 = *strongly agree*).

Performance was assessed through performance outcomes and quantified by direct winners and unforced errors of serves, returns, volleys, and ground strokes. Direct winners are considered shots that the opponent could hardly reach and hit uncontrollably and inaccurately, for instance with the frame of the racket. For the purpose of this study, the ratio of winners to unforced errors was calculated by dividing the higher score by the lower score. A positive performance ratio, the number of winners is higher than the number of unforced errors, is reflected by scores above zero, whereas a negative performance ratio, the number of unforced errors exceeds the number of direct winners, is signified by scores below zero.

Procedure

Following University standard ethic procedures, parents and players provided signed consent. Participants completed the FSS-2 short form during change of ends. A video camera was used to record participants' performance. Following the match, the performance outcome of each rally, regarding winners and unforced errors, was assessed visually and transcribed. The data analysis included general match statistics and visual assessment comparing flow-state and performance graphs.

Results and Conclusion

Player A won the training match 7:6, 6:2, showing higher percentage scores for second serves won and net points won. With regard to the service performance, Player A hit three aces and nine double faults and, whereas Player B hit no aces and 14 double faults. Table 1 shows the overall match statistics for serves, net play, and ground strokes for Players A and B. Figure 1 illustrates the differences in performance between participants across the two sets. Even though a tiebreaker decided the first set, Player A appeared to be more proactive and aggressive than Player B, trying to dictate groundstroke rallies, which was reflected in higher numbers of winners and unforced errors. At scores of 3:2 and 6:5, Player A dominated those games indicated by a difference in performance ratio of 4.33 points, halfway through, and 4.75 points, towards the end of the set. In addition, Player A dominated the rallies at the beginning and end of the second set, which is reflected in a high performance ratio. Throughout the two sets, Player B showed a mainly negative performance ratio, whereas Player A's performance fluctuated frequently between a positive and a negative performance ratio. Figure 2 shows the development of flow across both sets. The flow score for each measurement reflects the mean of the six flow items. The grey area highlights responses that participants reported as neither agree nor disagree (3) and agree (4), indicating that some characteristics of flow occurred, but the experience was not strong overall. Data points above the grey area signify that several flow attributes occurred during performance indicating a more substantial flow experience, whereas scores below the grey area denote little or no flow experiences.

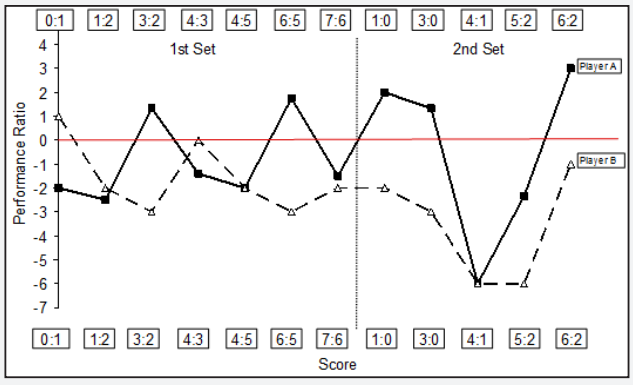

Figure 1: Performance (winner-unforced error ratio) Measurements for Players A and B across Sets.

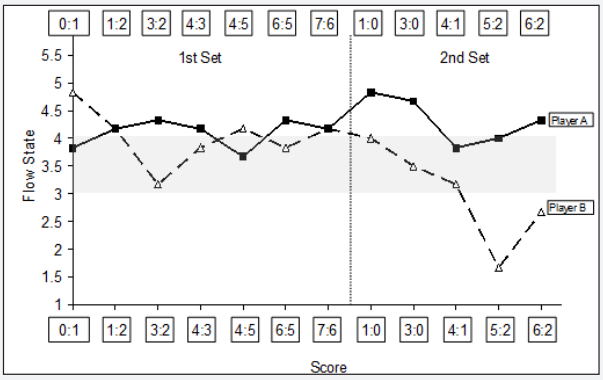

Figure 2 : Developments of Flow State for Player A and B across Sets.

Table 1: Match Statistics for both Participants.

	Player A	Player B
First serve percentage	42.47%	37.50%
Percentage of first serve points won	61.91%	63.33%
Second serve percentage	70.97%	72.00%
Percentage of second serve points won	35.48%	32.00%
Percentage of net points won	72.73%	50.00%
Groundstroke winners (number)	24	8
Groundstroke errors (number)	41	18

One of the main findings of this study was that flow and performance revealed a similar pattern. More specifically, both participants reported higher flow scores (> 4) when their performance ratio was positive. At this point the flow-performance patterns may not be conclusive to determine whether there was a one-directional effect from flow to performance or vice versa. This is mainly due to small sample size, limiting the explanatory power of the study. The positive link between flow and performance, however, was generally confirmed by previous studies in golf[14] and basketball[15]. Rees and colleagues[16] found that within full-time tennis player winners had more salient flow scores than losers, which further supports the results of this study.

This study provided new and potentially useful insight into the relationship between flow and performance in tennis. The development of flow during the course of a two-set tennis match showed a similar pattern with performance. Based on the outcomes of the first set, the data indicates that performance could have had a facilitating effect for Player A in regard to flow and match outcomes, whereas an opposite effect may have occurred for Player B. More studies using larger subject numbers and a detailed evaluation of flow and performance are needed

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to determine possible one-directional links between flow and performance, or whether flow and performance interact in a reciprocal relationship.

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