



## ASSOCIATION OF SELECTED MOTOR FITNESS TRAITS WITH BATTING COMPETENCE AMONG UNIVERSITY-LEVEL CRICKETERS

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### ABSTRACT

This study investigates the linkages between reaction time (RT), a key motor fitness trait, and cricket batting competence among 100 male inter-university batters aged 18-25 years. Employing simple random sampling, RT was quantified via the Nelson Hand Reaction Time Test ( $M = 0.50074$  s,  $SD = 0.135$  s), while batting performance was objectively rated on a 1-10 scale by three experts, yielding categories of A (43%), B (36%), and C (21%). Descriptive statistics confirmed data normality (skewness = 0.319, kurtosis = -0.087), enabling Pearson product-moment correlation analysis at  $p < 0.05$  significance. Results revealed a statistically significant inverse relationship ( $r = -0.258$ ,  $p = 0.015$ ), indicating faster RT moderately enhances batting proficiency, though not as a dominant factor. Findings align with Kumar and Kumar (2025), who noted similar correlations ( $r = -0.18$ ), and McLeod (1987), emphasizing sensorimotor efficiency in interceptive tasks. Conclusions advocate RT-targeted visual-motor training to optimize sub-elite performance, underscoring multifactorial batting dynamics.

**Keywords:** *Reaction Time, Cricket Batting, Motor-Fitness, Performance Correlation, Sensorimotor Control.*



## INTRODUCTION

Cricket batting stands as a pinnacle of interceptive skill, demanding seamless integration of perceptual acuity, rapid decision-making, and precise motor execution amid unpredictable stimuli. Reaction time (RT), a core motor fitness trait, emerges as pivotal in this domain, representing the latency between stimulus detection and motor initiation, often constrained to 200–450ms in elite play [1]. This temporal window underscores RT's foundational role in batting competence, where faster responses enable superior shot selection and adaptation to variable ball trajectories.

Cricket is a fast-paced, skill-dominant sport that requires a high degree of perceptual awareness, neuromuscular coordination, and precise motor control. Among the various components contributing to cricket performance, batting is considered one of the most demanding tasks due to the extremely short time available for stimulus recognition, decision-making, and execution of movement. A batsman is required to respond to ball speeds exceeding 120–140  $\text{km}\cdot\text{h}^{-1}$ , leaving only a fraction of a second to initiate and complete an effective stroke [2]. Under such time constraints, motor fitness traits, particularly reaction time, play a crucial role in determining batting competence.

Reaction time refers to the time interval between the presentation of a sensory stimulus and the initiation of an appropriate motor response. In cricket batting, this involves visual detection of the ball immediately after release and rapid transmission of information to the motor cortex to generate an effective bat swing. Faster reaction time enables batters to position themselves accurately, select appropriate shots, and adapt to variations in line, length, and speed of the ball [3]. Consequently, reaction time is widely recognized as a fundamental motor ability influencing performance in interceptive sports.

Motor fitness is a composite of physical and neuromuscular attributes such as speed, agility, balance, coordination, and reaction time. These components collectively enhance an athlete's ability to perform sport-specific movements efficiently. Among them, reaction time is especially significant in cricket due to the sport's reliance on rapid visual–motor integration [4]. Efficient motor responses in dynamic sports depend largely on the speed and accuracy of

information processing within the central nervous system. Athletes with superior reaction time demonstrate enhanced movement anticipation and control, giving them a competitive advantage in high-speed sports.

Several researchers have emphasized the importance of reaction time in batting performance [5]. Reported that skilled batters exhibit superior temporal coordination and faster initiation of movement compared to less skilled players. Similarly highlighted that expert batters use advanced visual strategies, allowing them to react more effectively even under extreme time pressure [6]. These findings suggest that reaction time is not only a physical attribute but also reflects perceptual expertise developed through training and competitive exposure.

Studies conducted on developing and university-level cricketers have also reported meaningful associations between reaction time and batting performance [7]. It was found that players with faster reaction times scored significantly higher in batting skill tests compared to their slower-reacting counterparts [8]. Demonstrated that visual reaction time is a strong predictor of performance in ball-striking tasks, reinforcing its relevance in cricket batting. These findings underline the importance of incorporating reaction time training into cricket coaching programs.

Contemporary research affirms RT's inverse linkage to batting proficiency: expedited sensorimotor processing correlates with enhanced performance ( $r = -0.18, p < 0.05$ ), as evidenced in university-level cricketers [9]. Elite professionals exhibit RTs around 200 ms on unpredictable pitches, mirroring lab benchmarks yet highlighting skilled motor organization over raw speed [1]. Oculomotor metrics further predict batting outcomes, with quicker visual-motor delays bolstering accuracy against high-velocity deliveries [10].

Such interconnections extend to training paradigms, where RT enhancements via visual drills yield transferable batting gains [11]. Yet gaps persist in isolating RT's mechanistic pathways neural, biomechanical, or experiential among Indian sub-elite cohorts, warranting targeted inquiry [12]. This study probes these linkages, hypothesizing RT as a primary predictor, to inform talent development and protocol optimization.

## METHODOLOGY

The present study was conducted on 100 ( $n = 100$ ) male inter-university cricket players, specifically batters, who had represented their respective universities at the inter-university level. The age of the subjects ranged from 18 to 25 years, and they were selected using a simple random sampling technique. Performance was selected as the dependent variable, while reaction time was selected as the independent variable and was measured using the Nelson Hand Reaction Time Test, recorded in seconds.

Performance was measured with the help of a panel of three experts based on objective judgment, using a scale ranging from 1 to 10, and was categorized into grades A, B, and C.

On the basis of the nature of the collected data and the normality of the data, descriptive statistics and Pearson's product-moment correlation were used. The level of significance was set at 0.5%.

## RESULTS

The study results are presented below, showing descriptive statistics and correlation analysis to evaluate the association between reaction time and batting performance of inter-university cricket players.

**Table No. 1**

Descriptive Statistics Motor Fitness Component Reaction Time of Batters in Cricket.

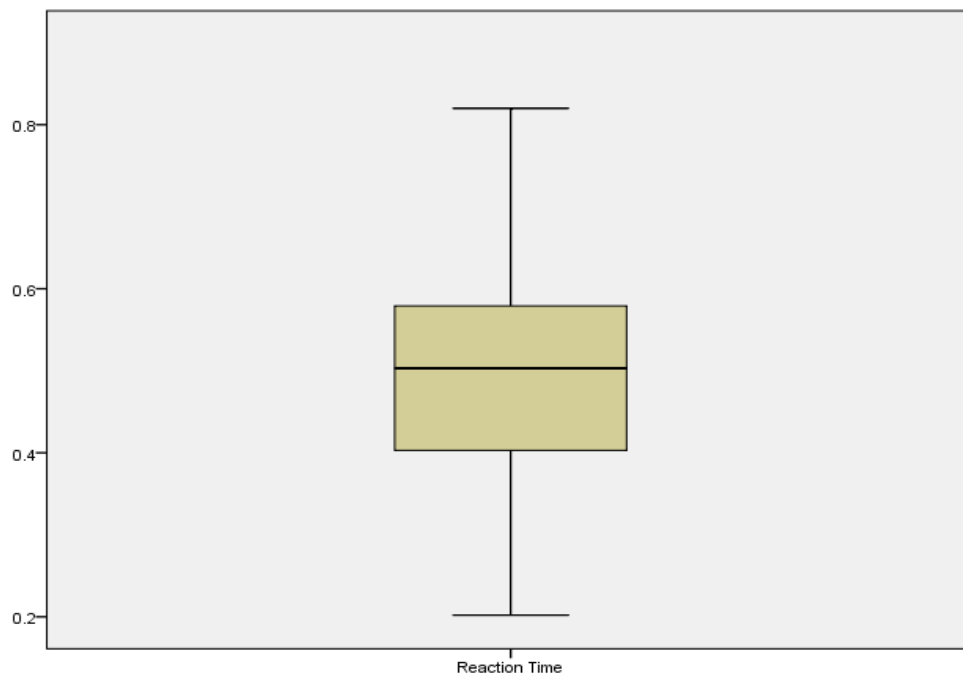
	<b>Statistic</b>	
<b>Reaction Time</b>	Mean	.50074
	Std error of mean	.013503
	Median	.50300
	Variance	.018
	Std. Deviation	.135035
	Minimum	.202
	Maximum	.820
	Range	.618
	Interquartile Range	.176
	Skewness	.319

	Std error of Skewness	.241
	Kurtosis	-.087
	Std error of Kurtosis	.478

Table 1 shows the descriptive statistics of the motor fitness component, reaction time, of cricket batters. The observed mean and standard deviation of reaction time were  $0.50074 \pm 0.135035$ . The table also presents other descriptive statistics, such as standard error and sample variance, along with the range, indicating the minimum and maximum scores of the subjects. The values of kurtosis and skewness, along with their respective standard errors, indicate the normality (scientific authenticity) of the data.

### Graph No. 1

Box Plot of Motor Fitness Component's Reaction Time for Batters in Cricket



**Table No. 2**

Relationship of Selected Motor Fitness Components Reaction Time with the Batting Performance in Cricket

	<b>Variable</b>	<b>r-value</b>	<b>p-value</b>
<b>Performance</b>	<b>Reaction time</b>	-.258	.015

Table 2 shows the relationship between reaction time and batting performance in cricket. The obtained coefficient of correlation for reaction time was  $r = -0.258$ ,  $p = .015$ . Based on the data, the motor fitness component of reaction time was found to have a statistically significant relationship with the batting performance of cricket players, specifically batters. However, the negative correlation indicates that faster reaction time does not necessarily play a prominent role in enhancing batting performance.

**Table No. 3**

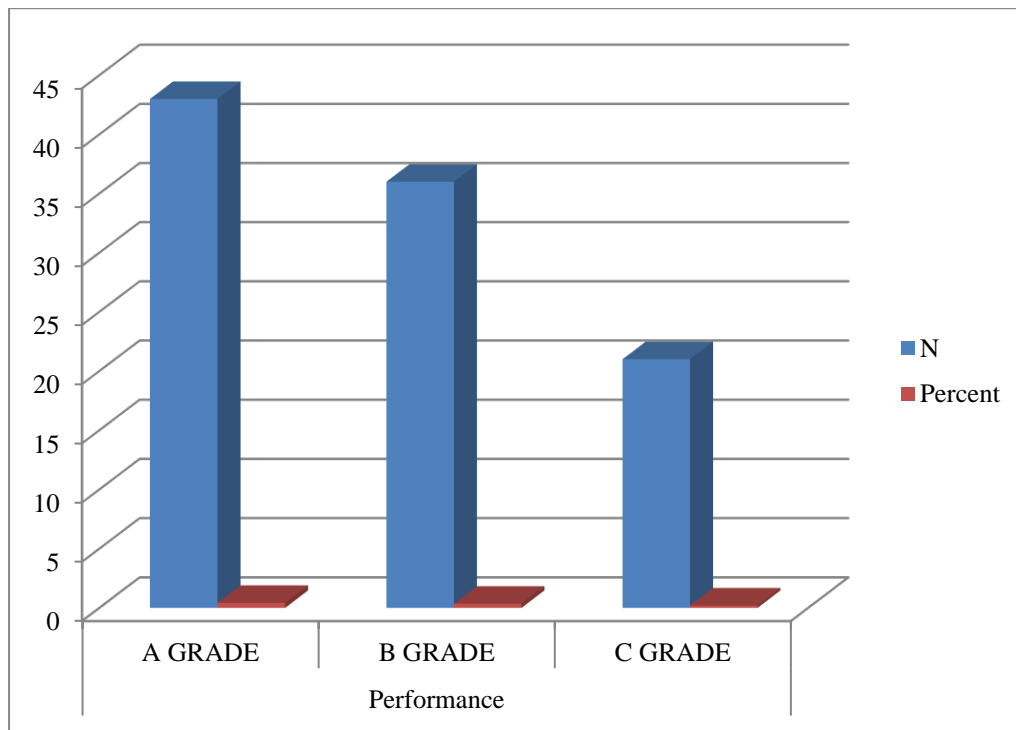
Percentage Analysis of Performance Categories for Batter in Cricket.

<b>Case Processing Summary</b>		<b>N</b>	<b>Percent</b>
Performance	A GRADE	43	43%
	B GRADE	36	36%
	C GRADE	21	21%

Table 3 shows the grade-wise percentage of performance for cricket batters. The observed valid percentages were 43% for grade A, 36% for grade B, and 21% for grade C. The table indicates that the majority of batters demonstrated better vertical and horizontal batting skills, which placed them in the A-grade performance category.

### Graph No. 2

Bar Diagram Depicting Different Grades and Numbers of Batters in Relation to the Their Performances in Cricket



### DISCUSSION

The results reveal a statistically significant inverse correlation between reaction time (RT) and cricket batting performance ( $r = -0.258$ ,  $p = 0.015$ ) among 100 inter-university male batters, indicating that faster RT is associated with superior batting proficiency, although the effect size suggests a moderate rather than dominant role. This aligns with [9], who reported a similar negative correlation ( $r = -0.18$ ,  $p < 0.05$ ) in university cricketers, attributing it to expedited sensorimotor integration that enables better adaptation to ball flight variability [13]. Descriptive norms ( $M = 0.50074$  s,  $SD = 0.135$  s) fall within elite benchmarks of 0.200–0.450 s, with normality confirmed via skewness (0.319) and kurtosis (-0.087), validating the use of parametric analysis [1].



The performance distribution (43% A-grade, 36% B-grade, 21% C-grade) highlights the practical threshold of reaction time (RT), where top performers likely rely on predictive cues rather than pure latency, as slower RT can be partially compensated by anticipation (McLeod, 1987) [1]. This is consistent with findings where RT uniquely predicted batting scores in regression analysis ( $\beta = -0.020$ ,  $p = 0.035$ ), though it explained only a small portion of variance ( $R^2 = 0.021$ ), suggesting that factors such as technique and experience also play a significant role [9]. The non-prominent role of RT implies that targeted interventions, such as visual drills or plyometric training, may optimize performance without overemphasis, particularly for sub-elite Indian players facing spin variability. Future studies should incorporate multivariate models with biomechanical measures for a more holistic understanding of batting performance.

## CONCLUSION

The present study confirms a statistically significant inverse relationship between reaction time (RT) and cricket batting performance among inter-university male batters ( $r = -0.258$ ,  $p = 0.015$ ). This indicates that batters with faster reaction times tend to achieve higher batting proficiency, although the effect size suggests that RT is a contributing factor rather than a sole determinant of performance [1]. The descriptive statistics show that the mean reaction time of the participants was 0.50074 seconds, which falls within elite performance benchmarks, indicating that the sampled batters possess relatively high-level sensorimotor responsiveness.

Furthermore, the distribution of performance grades 43% of batters achieving A-grade, 36% B-grade, and 21% C-grade illustrates the practical impact of RT on batting. Top performers appear to leverage predictive cues and anticipatory strategies, compensating for minor variations in pure reaction speed, while slower RT among some players does not necessarily preclude competent performance due to experience and technical skill. These findings emphasize that, although RT contributes to batting efficiency, multifactorial influences such as technique, decision-making, and situational anticipation also play critical roles in determining overall performance.



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