Review Article

Essential visual skills for cricket performance and talent development: a review of the literature

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ABSTRACT

Background: Vision is fundamental to cricket performance, enabling players to process complex visual information and execute accurate motor responses under severe temporal constraints. Although numerous visual skills have been associated with cricket performance, uncertainty remains regarding their relative importance and practical application in talent identification and player development. This review critically examines the visual skills associated with cricket performance and evaluates their relevance for talent identification and player development.

Methods: A structured literature search was conducted across multiple electronic sources, including PubMed/MEDLINE, ScienceDirect, Google Scholar, NRC-CISTI, SPORTDiscus via EBSCOhost, and the Cochrane Database of Systematic Reviews. Where available, Medical Subject Headings (MeSH), together with free-text keywords related to cricket, vision, and visual performance were combined using Boolean operators. Eligible English-language sources included cross-sectional, longitudinal, cohort, and intervention studies; narrative and systematic reviews; and relevant books, book chapters, dissertations, theses, and conference proceedings. Retrieved publications were screened for eligibility, and data were extracted and synthesized narratively according to the visual skills examined and their reported associations with cricket performance, talent identification, and player development. For narrative synthesis, the identified visual skills were conceptually classified into visual hardware skills, comprising fundamental, non-task-specific optometric and binocular visual abilities, and visual software skills, encompassing task-related gaze-control, visual-information-processing, perceptual-cognitive, and visuomotor abilities.

Results: A total of 85 records were identified through the literature search, of which 15 duplicates were removed. Of the 70 records screened, 50 underwent full-text assessment, and 30 publications met the inclusion criteria and were included in the final narrative synthesis. The identified visual skills were organized into two broad conceptual categories: visual hardware skills, comprising fundamental, non-task-specific optometric and binocular visual abilities, and visual software skills, encompassing task-related gaze-control, visual-information-processing, perceptual-cognitive, and visuomotor abilities. The available literature suggested that these complementary skill domains may contribute to cricket performance, with visual hardware skills supporting visual input and visual software skills supporting the interpretation and translation of visual information into sport-specific motor responses. However, the strength and directness of the evidence varied across individual skills.

Conclusions: This review highlights the possible complementary roles of visual hardware and visual software skills in cricket performance and provides a conceptual framework for examining the sport's visual demands. The 14 visual skills identified from the available literature may inform the future development and evaluation of cricket-specific visual assessment batteries and targeted vision training programs. Further direct research is required to determine whether assessment or enhancement of these skills improves talent identification, player development, or performance in competitive cricket.

KEYWORDS

cricket sports, talent, vision test, binocular vision, sport, athletic performances, sport medicine, visual feedback, motor skill, sensory feedback, ocular accommodation, sensory processing

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INTRODUCTION

Vision is a complex sensory function that extends beyond the basic ability to see clearly. It enables individuals to perceive information from the environment and continuously adapt their actions through perception-action coupling to support goal-directed behavior [1]. These processes rely on a range of visual skills that enable individuals to accurately process spatial and temporal information and to enable adaptive responses to environmental demands [2]. In cricket, vision serves as the primary source of external information, allowing athletes to recognize relevant cues, track moving objects, estimate distance and speed, and regulate motor actions under constantly changing weather conditions [1–3].

Although visual processing is fundamental to athletic performance across all sports, specific visual demands differ depending on the characteristics, pace, and perceptual-motor requirements of each sport [1]. Cricket presents a particularly challenging perceptual environment, requiring players to interpret complex visual information and produce accurate motor responses within extremely short time frames [2]. Batters, fielders, and wicketkeepers must judge ball trajectory, velocity, and timing while simultaneously adapting to contextual factors such as pitch conditions, bowler variation, and match situations [1–3]. These requirements place substantial demands on perceptual accuracy, anticipation, and decision-making under pressure [1–3]. Despite the central role of vision in such tasks, much of the existing literature has traditionally examined visual abilities in isolation, which may not fully capture the integrated perceptual and visuomotor demands of competitive performance [2, 3].

Over the past twenty years, sports vision has received increasing attention, particularly among athletes, coaches, and practitioners seeking strategies to improve visual processing, perceptual efficiency, competitive performance, and talent identification [1, 2]. Vision training programs have been developed to improve the rapid processing of visual information and its integration with motor responses [4]. This integration is essential in sports that require precise coordination and rapid reactions, where anticipation, decision-making, and response time depend on efficient visual processing and the timely interpretation of visual information [3, 5]. Focused vision training may improve perceptual-cognitive function and athletic performance across sports [6]. Reliance on fundamental visual perception alone is insufficient to explain top performance or disparities in playing competence—particularly in cricket, where high ball velocities and severe temporal constraints place exceptional demands on anticipation, visuomotor integration, and higher-order perceptual-cognitive processing [2, 3].

Although the importance of advanced visual skills is increasingly recognized, their systematic assessment and development remain relatively underutilized in cricket training programs, particularly in youth and developing players [3, 7–9]. Furthermore, inconsistencies persist in the literature regarding which visual skills are most influential for cricket performance and the most appropriate methods for their evaluation [10, 11]. Consequently, despite growing evidence supporting the importance of advanced visual skills, their integration into applied performance settings and talent identification programs remains limited [8–10]. Hence this review aims to critically examine the visual skills associated with cricket performance and evaluate their relevance to talent identification and player development [4, 12–14]. In this review, the term “essential” is used conceptually to describe visual abilities considered relevant to cricket performance in the reviewed literature and does not indicate that necessity, causal effects, or minimum performance requirements have been established for every identified skill.

METHODS

To identify literature on visual skills relevant to cricket, targeted searches were conducted in PubMed/MEDLINE, ScienceDirect, Google Scholar, the National Research Council Canada Institute for Scientific and Technical Information (NRC-CISTI) Catalogue, SPORTDiscus via EBSCOhost, and the Cochrane Database of Systematic Reviews. Eligible publications were limited to English-language sources published between January 1, 1997, and December 31, 2025, with the same publication-date eligibility period applied across all databases. This search period was selected to incorporate the most recent methodological developments, research findings, and technological innovations relevant to the review. Reference lists of eligible publications were also screened to identify additional relevant sources, including books, book chapters, dissertations, theses, conference proceedings, and journal articles not retrieved through the electronic database searches.

Medical Subject Headings (MeSH), where available, and free-text keywords were combined using Boolean operators. The search strategy incorporated terms related to cricket and visual performance, including sports vision, visual acuity, dynamic visual acuity, accommodation, stereopsis, depth perception, contrast sensitivity, binocular fusion, glare recovery, vergence, saccadic eye movements, gaze behavior, visual memory, hand-eye coordination, peripheral vision, peripheral awareness, ball tracking, visual reaction time, recognition speed, anticipation, decision-making, talent identification, and player development. The search strategy was adapted, as appropriate, to the indexing structure and search functionality of each database.

English-language full-text sources were eligible for inclusion. Eligible empirical designs included cross-sectional, longitudinal, cohort, and intervention studies. Relevant narrative and systematic reviews, books or book chapters, dissertations, theses, and conference proceedings were considered where they provided substantive information on human visual, perceptual-cognitive, or visuomotor abilities relevant to cricket. Titles and abstracts were initially screened, followed by full-text assessment of potentially eligible sources. Cricket-specific studies were treated as direct evidence, whereas evidence from related interceptive sports was treated as indirect evidence and used to supplement the cricket-specific literature. Publications that did not directly assess human visual or perceptual performance, including computer-vision, video-processing, instrument- or sensor-engineering studies, were used only to provide contextual information and were not treated as direct evidence that a visual skill contributes to cricket performance. Duplicate records, non-English-language publications, abstract-only records without sufficient information, and sources that were unrelated to human visual, perceptual-cognitive, or visuomotor abilities, cricket performance, relevant evidence from related interceptive sports, or cricket-specific technological context were excluded.

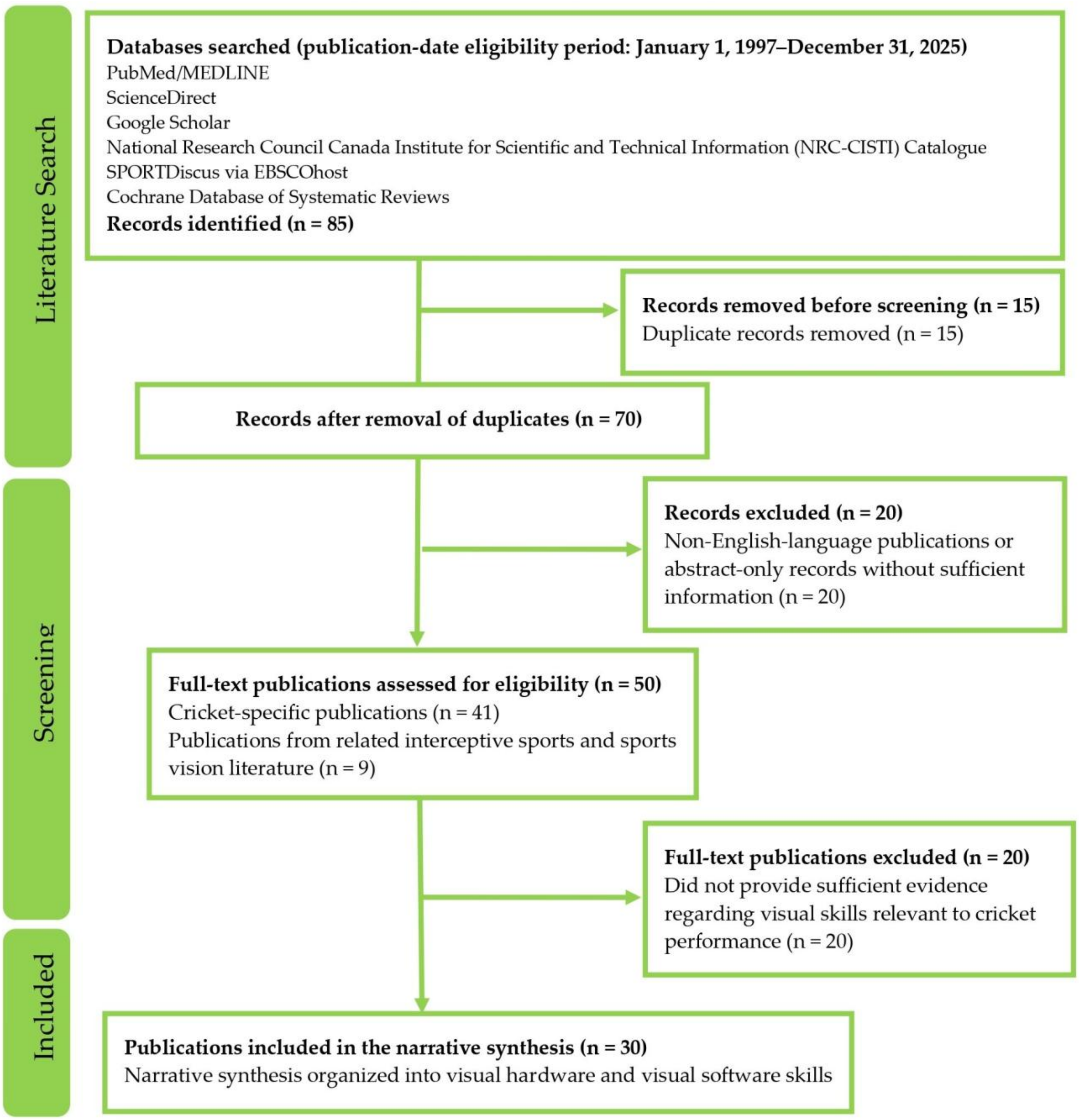

Figure 1. Flowchart depicting the search strategy and the process of screening and selecting eligible publications for inclusion in this review.

The literature search identified 85 records, of which 15 duplicate records were removed before screening. Of the 70 records screened by title and abstract, 20 were excluded, leaving 50 full-text sources, including journal articles, reviews, books, dissertations, and theses, for eligibility assessment. At full-text assessment, 20 sources were excluded because they did not provide sufficient evidence regarding visual skills relevant to cricket performance. Thirty publications met the inclusion criteria and were included in the final narrative synthesis. The included publications corresponded to References 2–4, 15, 16, and 17–41; the other cited references provided background or contextual support but were not counted among the 30 publications included in the narrative synthesis. The study selection process is illustrated in Figure 1. As this was a narrative review, protocol registration and formal risk-of-bias assessment were not undertaken.

The first author independently reviewed all eligible full-text articles and extracted data on study characteristics, and evaluated visual skills, participant characteristics, assessment methods, and principal findings. Eligibility decisions and extracted data were independently reviewed by a co-author, and any disagreements were resolved through discussion until consensus was reached. The included studies were synthesized narratively according to the visual skills examined and their reported associations with cricket performance, talent identification, and player development. For clarity of presentation, the identified visual skills were subsequently organized using a conceptual hardware and software classification adopted from the sports-vision literature [17, 42]: visual hardware skills, comprising fundamental, non-task-specific optometric and binocular visual abilities, and visual software skills, encompassing task-related gaze-control, visual-information-processing, perceptual-cognitive, and visuomotor abilities. This framework was used to facilitate comparison across studies and to discuss the potential contribution of each category to cricket performance, talent identification, and player development. Particular attention was given to the methods used to assess these visual skills, their relationship with on-field performance, and their practical implications for coaching and athlete development.

RESULTS

The literature search identified 85 records, of which 15 duplicates were removed. Of the 70 records screened, 50 underwent full-text assessment, and 30 publications met the inclusion criteria and were included in the final narrative synthesis. For clarity of presentation, the identified visual skills were organized into two broad conceptual categories: visual hardware skills, comprising fundamental, non-task-specific optometric and binocular visual abilities (Table 1), and visual software skills, encompassing task-related gaze-control, visual-information-processing, perceptual-cognitive, and visuomotor abilities (Table 2). This conceptual hardware and software classification was adopted from the sports-vision literature and was used to organize the identified visual skills [17, 42].

Table 1. Visual hardware skills considered relevant to cricket

Visual Skills	Description
Dynamic and static visual acuity [2, 3, 15, 18, 19].	The ability to resolve fine spatial detail under both stationary (static visual acuity) and moving (dynamic visual acuity) viewing conditions.
Accommodation facility [18–20].	The ability to rapidly adjust focus between distant and near targets, which may assist visual focus shifts between players, the pitch, and the moving ball during cricket play.
Depth Perception [17, 21–23].	Enables accurate perception of object distance and three-dimensional spatial relationships, helping batters judge the ball's distance, trajectory, and timing for bat-ball contact, while supporting bowlers' spatial judgment and target localization during ball delivery.
Contrast sensitivity [2, 17, 23].	Facilitates the detection and discrimination of visual information under varying viewing conditions and may therefore support visual perception during cricket.
Fusion flexibility [3, 24–26].	Helps maintain stable binocular vision during rapid eye movements associated with ball tracking and fixation changes.
Glare recovery [2, 17].	The ability of the visual system to regain visual performance following exposure to intense light or glare; its direct relationship with cricket performance has not been established.
Vergence ability [24].	The ability to coordinate inward and outward eye movements to maintain single binocular vision while tracking the ball throughout play.

Note: Visual hardware skills refer to fundamental, non-task-specific optometric and binocular visual abilities.

Table 2. Visual software skills considered relevant to cricket

Visual Skills	Description
Saccadic eye movements [3, 4, 27–30].	Rapid, ballistic shifts of gaze that reposition the fovea onto objects of interest for high-acuity visual processing.
Visual memory [31].	Visual memory is the capacity to retain and retrieve previously viewed visual information; however, its direct contribution to cricket performance has not been established.
Hand-eye coordination [30, 32, 33].	Effective hand-eye coordination enables batters to accurately intercept the incoming ball with the bat, while helping fielders execute timely and precise catches of fast-moving balls.
Peripheral awareness [31, 34].	Peripheral awareness enables batters to maintain central fixation on the ball while simultaneously monitoring relevant information in the surrounding visual field, supporting anticipation, decision-making, and performance.
Ball tracking [35, 36].	Human visual ball tracking refers to the use of gaze and eye–head movements to acquire visual information from a moving ball during an interceptive action.
Reaction time [16, 36, 37].	In cricket, rapid reaction time may facilitate timely responses to fast deliveries and changes in ball movement.
Speed of recognition [31, 38].	Speed of recognition refers to how quickly an athlete identifies and interprets task-relevant visual information to guide an appropriate response; direct evidence in cricket batters remains limited.

Note: Visual software skills refer to task-related gaze-control, visual-information-processing, perceptual-cognitive, and visuomotor abilities.

DISCUSSION

This review highlights the potential importance of visual skills in cricket performance and player development. The available evidence suggests that both fundamental, non-task-specific optometric and binocular visual abilities (visual hardware skills) and task-related gaze-control, visual-information-processing, perceptual-cognitive, and visuomotor abilities (visual software skills) may contribute to cricket performance [2]. Targeted visual skill development may improve selected visual or perceptual outcomes [4], although consistent transfer to on-field performance has not been established. Vision is widely recognized as the primary sensory system for acquiring information about the surrounding environment [2]. It is essential for processing environmental cues and for planning, controlling, and executing goal-directed human movement [3, 4].

Vision facilitates fine motor coordination by continuously interacting with proprioceptive and perceptual processes to guide movement [43]. Although proprioceptive and vestibular inputs also contribute to motor control, vision provides the primary source of external information required for accurate motor performance [4, 14]. In cricket, selective visual attention is critical because players must focus on task-relevant visual cues including the bowler's hand, ball release point, seam orientation, and ball trajectory while suppressing irrelevant environmental information such as crowd distractions and other non-task-related visual stimuli, to support accurate anticipation, decision-making, and performance [3, 4]. Qualitative evidence from professional Twenty20 cricketers further indicates that batters and bowlers integrate stable and dynamic contextual information with kinematic cues to form probabilistic expectations, evaluate available options, and guide anticipation and decision-making [44].

Selective visual attention facilitates anticipation, timing, and decision-making during batting, bowling, and fielding activities [45]. Although considerable research has examined the biomechanical, physiological, and physical determinants of cricket performance, comparatively less attention has been directed toward the contribution of the visual system and sport-specific visual skills [3, 13, 43, 45, 46]. The available evidence suggests that visual skills may contribute to cricket performance by enabling players to perceive, process, and respond to dynamic game-specific information [13]. Effective visual functioning may support decision-making, timing, and visuomotor execution [16]. However, evidence that deficiencies in individual visual skills limit long-term athletic progression, or that their targeted development improves cricket performance, remains limited [3, 13, 46]. Therefore, these findings support further evaluation of key visual skills within cricket training and talent-development settings rather than establishing their routine assessment or targeted development as evidence-based components of such programs.

Visual skills are commonly classified into two complementary categories: visual hardware and visual software skills [17, 42]. Visual hardware comprises fundamental, non-task-specific optometric and binocular visual abilities, including dynamic and static visual acuity [2, 3, 15, 18, 19], accommodation facility [18–20], depth perception [17, 21–23], contrast sensitivity [2, 17, 23], fusion flexibility [3, 24–26], glare recovery [2, 17], and vergence ability [24]. In contrast, visual software encompasses task-related gaze-control, visual-information-processing, perceptual-cognitive, and visuomotor abilities, including saccadic eye movements [3, 4, 27–30], visual memory [31], hand-eye coordination [30, 32, 33], peripheral awareness [31, 34], ball tracking [35, 36], reaction time [16, 36, 37], and speed of recognition [31, 38]. Together, these complementary visual domains provide a conceptual framework for examining perception, anticipation, decision-making, and skilled performance in cricket.

Visual hardware skills

Dynamic and static visual acuity are fundamental visual functions that may contribute to cricket performance [2, 3, 15, 18, 19]. Players require clear vision under both stationary and dynamic viewing conditions, enabling perception of the moving ball as well as other players and game-related events [2, 3]. Given the high ball velocities and rapidly changing visual demands of cricket, dynamic visual acuity is relevant to resolving fine visual detail in moving targets [19]. Accordingly, cricket performance may depend not only on good static visual acuity but also on the ability to resolve moving objects under dynamic viewing conditions. Dynamic visual acuity may assist players in resolving fine spatial detail in the moving ball but should not be equated with direct measurement of ball trajectory, speed, or spatial position [47]. Kelly and Roberts reported that skilled cricketers displayed significantly better dynamic visual acuity than non-cricketers. Furthermore, increasing target velocity had a smaller adverse effect on dynamic visual acuity in skilled players, suggesting greater resistance to velocity-related performance decline [47]. These findings indicate that dynamic visual acuity may be relevant to cricket performance under the high-speed conditions encountered during batting and fielding.

Accommodative facility is frequently incorporated into sports vision training programs, where improvements in accommodative flexibility and other visual functions have been reported, although evidence linking these improvements directly to cricket performance remains limited [19, 20]. Atchison et al. [18] discussed the theoretical role of accommodative facility in sports requiring rapid shifts in focus, such as baseball and cricket, but concluded that available evidence was insufficient to demonstrate a direct contribution of dynamic accommodation to batting performance or time-to-contact judgments [18]. Nevertheless, accommodative facility continues to be investigated as one component of comprehensive sports vision training programs aimed at enhancing visual efficiency in athletes [18, 20]. Current evidence suggests that accommodative facility may support overall visual function within multidisciplinary sports vision programs; however, its independent contribution to cricket performance remains uncertain and warrants further investigation [18–20].

Although research examining depth perception specifically in cricket remains limited, evidence from interceptive ball sports supports its likely importance for performance [17, 21, 22]. A recent review highlighted that dynamic depth perception plays a critical role in interceptive actions, including catching and striking fast-moving balls, which closely resemble the visual demands encountered during cricket batting and fielding [19]. Evidence from reviews and observational studies indicates that athletes participating in interceptive sports generally demonstrate superior depth perception compared with non-athletes, findings that are also summarized in sports vision textbooks [17, 21, 22]. These findings suggest that well-developed depth perception is likely to be an important visual skill for cricket, although direct sport-specific evidence remains limited. Additionally, sports vision literature consistently identifies depth perception as one of several key visual abilities supporting perceptual-motor coordination and athletic performance across a wide range of sports, further reinforcing its likely relevance in cricket [17, 21].

Contrast sensitivity is considered an important component of sports vision because athletic performance depends on accurate visual information and its efficient perceptual processing [2, 17]. Sports vision literature identifies contrast sensitivity as one of the fundamental visual functions evaluated in athletes participating in dynamic interceptive sports, where efficient visual discrimination may support performance [17]. In cricket fielders, Christie et al. found that sunglass tint significantly affected contrast sensitivity and stereopsis; however, neither the number nor the quality of catches differed between tint conditions during controlled indoor testing [23]. These findings indicate that differences in selected visual hardware measures do not necessarily translate into differences in sport-specific performance. Contrast sensitivity may therefore be considered as one component of comprehensive visual assessment in cricket players, although its direct relationship with on-field cricket performance requires further investigation [2, 17, 23].

Cricket is frequently played over prolonged periods, during which visual fatigue may adversely affect binocular coordination and visual performance [3, 24, 26]. Adequate fusion flexibility enables players to sustain visual efficiency throughout long innings or matches, supporting consistent perceptual performance and reducing symptoms such as eye strain, blurred vision, or reduced concentration [24]. In many sports, efficient fusion flexibility also contributes to accurate depth perception and spatial orientation, facilitating precise localization of moving objects within three-dimensional environments [24, 25]. Maintaining stable binocular single vision while tracking the ball from the bowler's release through bat-ball contact is essential for effective batting performance [24]. Rapid changes in viewing distance and high ball velocities place considerable demands on the binocular visual system during cricket performance [26]. Accordingly, assessment of fusion flexibility may be considered as part of a comprehensive sports vision evaluation for cricket players, with appropriate management when binocular vision anomalies are detected [26].

Glare recovery may be relevant to sports vision assessment in cricket because it could influence an athlete's ability to regain visual efficiency following exposure to high-luminance conditions [2, 17]. Cricket is frequently played in bright outdoor environments where exposure to intense sunlight or reflective surfaces may temporarily reduce visual clarity. Athletes with efficient glare recovery may theoretically restore visual function more rapidly following exposure to intense light, potentially limiting temporary disruption of ball tracking, depth judgement, and movement timing during batting and fielding [2, 17]. However, these potential performance consequences have not been directly demonstrated in cricket. Christie et al. examined the effects of sunglass tint on indoor catching performance but did not measure glare recovery and found that tint colour did not affect the number or quality of catches [23]. Accordingly, that study should not be interpreted as evidence that glare-recovery ability contributes to cricket performance. Evaluating glare recovery may provide additional information on an athlete's visual adaptability under challenging illumination conditions and may be considered as one component of a comprehensive sports vision assessment for cricket players; however, its predictive value and relationship with on-field performance require direct investigation [2, 17].

Vergence ability contributes to efficient binocular coordination by enabling accurate alignment of both eyes during changes in fixation distance, thereby supporting single binocular vision while tracking moving objects [17, 24]. Research in sports vision suggests that athletes participating in visually demanding sports generally display well-developed binocular visual functions, including vergence, which support dynamic visual tracking and overall visual performance [17, 24]. Although studies specifically evaluating vergence ability in cricket remain limited, evidence from related interceptive sports suggests that efficient vergence responses may facilitate ball tracking, depth judgement, and visual anticipation during fast-paced play [17, 24]. These findings support the inclusion of vergence assessment as part of a comprehensive sports vision evaluation for cricket players, although further sport-specific research is needed to establish its direct contribution to cricket performance [17, 24].

Visual software skills

Saccadic eye movements are rapid, ballistic shifts of gaze that reposition the fovea onto objects of interest [27]. In cricket, saccades are fundamental during batting because players repeatedly shift their gaze between the bowler's hand, the point of ball release, the predicted bounce location, and the moving ball, enabling continuous updating of task-relevant visual information [27]. Efficient saccadic control enables batters to rapidly redirect gaze toward visual cues related to ball trajectory, speed, and spin, thereby facilitating anticipatory decision-making [4, 27]. Studies of expert cricket batters have shown that skilled performers employ predictive saccades to anticipated ball-bounce and bat-ball contact locations, while evidence from other interceptive sports indicates that elite athletes exhibit more accurate and consistent saccadic eye movements than non-athletes, reflecting superior oculomotor control and visual efficiency [27, 28].

Efficient saccadic eye movements are considered important for rapidly redirecting gaze toward task-relevant visual information during interceptive sports like cricket [3, 27]. A recent study evaluated a software-based saccadic eye-movement time test but found poor-to-acceptable intraexaminer repeatability and moderate-to-good interexaminer reliability, indicating that measurements obtained using this particular method should be interpreted cautiously [29]. In cricket, efficient gaze strategies facilitate timely acquisition of visual information required for anticipation and shot selection, although the exact contribution of specific saccadic characteristics continues to be investigated [3, 27]. Conversely, suboptimal saccadic control may reduce the efficiency of visual information acquisition during batting, potentially affecting anticipation and shot selection [3, 27]. Vision training programs incorporating oculomotor and perceptual exercises have evidenced improvements in selected visual skills and some cricket-related performance measures, though further high-quality studies are needed to confirm consistent transfer to on-field performance [3]. Despite ongoing debate about the precise timing of predictive saccades, evidence indicates that expert performers may employ more efficient gaze behaviors than less-skilled players during interceptive tasks, supporting the potential importance of efficient saccadic eye control in expert performance across interceptive sports [3, 27, 28].

Visual memory refers to the ability to encode, store, and retrieve previously viewed visual information [31]. In cricket, this ability could theoretically help players retain information about opponents and game situations and may thereby support anticipation and decision-making during batting and fielding. However, direct evidence demonstrating that visual memory independently contributes to cricket performance is lacking. In a study of a related sport, Mathe et al. [31] found no statistically significant difference in visual-memory performance between netball players and non-athletes, suggesting that this ability may vary according to the sport and assessment method [31]. The other publications previously cited in relation to visual memory primarily addressed motor coordination, peripheral vision, or technological ball tracking rather than human visual-memory performance [32–34, 39]. Consequently, visual memory should be regarded as a potentially relevant perceptual-cognitive ability rather than an established determinant of cricket performance.

Hand-eye coordination refers to the ability to integrate visual input with motor output, enabling precise, well-timed physical responses [33]. In cricket, this skill is relevant to batting, catching, throwing, and wicketkeeping, which require players to synchronize visual information with rapid motor actions. Effective hand-eye coordination may help batters align the bat with the ball's trajectory and help fielders coordinate their responses when catching moving balls [32, 33]. Evidence from related ball-sport and visuomotor research supports the relevance of visual–motor integration to interceptive actions, but the cited studies do not demonstrate that skilled cricket players have superior hand-eye coordination compared with less-skilled cricket players [30, 32, 33]. Visual-haptic feedback has improved selected coordination and motor outcomes in simulated ball-sport training, although its transfer to cricket performance has not been established [32]. Consequently, hand-eye coordination is considered a potentially important visual software skill for cricket, while direct cricket-specific evidence remains limited [32, 33].

Vater et al. [34] refer to peripheral awareness as the ability to detect and process visual information outside the central field of vision; in cricket, this skill is considered important for batters monitoring field placements, runners between wickets, and changes in bowler movement while maintaining central fixation on the ball. Fielders likewise rely on peripheral vision to track ball movement while maintaining awareness of teammates, opponents, and field boundaries [34]. They indicate that skilled athletes make more effective use of peripheral visual information and adopt more efficient gaze strategies than less-skilled performers, proposing peripheral vision training as a means of enhancing visual attention and information processing in dynamic team sports [34]. Given the dynamic and multi-stimulus nature of cricket, peripheral awareness represents an important visual skill supporting both offensive and defensive performance [31].

Human visual ball tracking involves the use of gaze and coordinated eye-head movements to acquire information from the moving ball during an interceptive action [35, 36]. A study of cricket batting identified skill- and age-related differences in the visual strategies used to follow and intercept the ball, suggesting that more-skilled batters may acquire ball-flight information more effectively than less-skilled batters [35]. These visual strategies may support perceptual accuracy and movement timing during batting [35, 36]. In contrast, Abbas et al. used deep-learning algorithms to track cricket balls in broadcast footage [39], and Balbudhe et al. developed a sensor-based cricket ball for bowling-performance analysis [40]. These technological studies provide contextual information but do not assess human visual ball-tracking ability.

Human visual ball tracking may contribute to anticipatory control by enabling batters and fielders to use available ball-flight information during interceptive actions [35, 36]. Limitations in the acquisition of ball-flight information could compromise the timing and accuracy of bat–ball or hand–ball interception [35]. Perceptual-cognitive training has been shown to improve anticipation and decision-making, although transfer to on-field performance is smaller than improvement in laboratory performance [38]. Consequently, human visual ball tracking should be considered potentially important to cricket performance, while its independent contribution and trainability require further direct investigation [35, 36].

Reaction time refers to the speed at which an athlete responds to a stimulus; in cricket, rapid reaction time may facilitate responses to fast deliveries, deflections, and changes in ball movement [36]. Batters operate under substantial temporal constraints when perceiving ball flight, making a decision, and initiating an appropriate motor response [16, 36]. Faster sport-specific responses may allow players to initiate movement earlier and adjust batting strokes more effectively [36].

Elite athletes may demonstrate superior perceptual-cognitive processing and faster sport-specific responses than less-skilled athletes [16, 36]. In university-level indoor cricketers, Evans et al. [37] found that experimentally induced mental fatigue impaired cricket-related running performance but did not significantly change reaction time assessed using the

Batak system, suggesting that this general reaction-time task may not have been sufficiently sport specific [37]. Therefore, the available evidence does not establish that a general visual reaction-time measure directly predicts cricket performance. Training incorporating stimulus-response exercises may improve selected reaction-time or perceptual-processing outcomes, but consistent transfer to on-field cricket performance has not been established [36]. Consequently, reaction time should be considered potentially relevant to cricket performance, while its independent contribution and appropriate method of assessment require further investigation.

Speed of recognition refers to how quickly an athlete identifies and interprets relevant visual information [31]. In cricket, rapid recognition of advance kinematic cues from the bowler, including body movements and ball-release characteristics, could assist batters in anticipating ball type and trajectory. Evidence from netball indicates that athletes may perform better than non-athletes on a speed-of-recognition task, but this represents indirect evidence and does not establish the corresponding ability in cricket batters [31]. Oldfield [41] examined the demands, competencies, and development of first-class cricket umpires and therefore provides contextual information about cricket officiating rather than direct evidence of recognition speed in batters [41].

Enhanced speed of recognition may facilitate more efficient information processing and decision-making under pressure. Research supports the potential of perceptual-cognitive training to improve anticipation and decision-making in sport, although transfer to on-field performance is more limited than improvement in laboratory performance [38]. Consequently, speed of recognition may represent a relevant higher-order visual skill in cricket, but its direct contribution to batting performance requires cricket-specific investigation [31, 38].

This review provides a synthesis of the visual skills considered relevant to cricket performance by integrating evidence from sports vision and cricket-specific literature. A particular strength is the organization of these skills into two complementary conceptual domains, visual hardware skills (fundamental, non-task-specific optometric and binocular visual abilities) and visual software skills (task-related gaze-control, visual-information-processing, perceptual-cognitive, and visuomotor abilities), which offers a conceptual framework for future research, clinical assessment, and athlete development. A structured search strategy, predefined eligibility criteria, and systematic screening procedures were employed to enhance the transparency of the review process; however, formal risk-of-bias and certainty-of-evidence assessments were not undertaken. Nevertheless, several limitations should be acknowledged. As a narrative review, the findings are inherently dependent on the quality and heterogeneity of the available literature, and some relevant studies or emerging visual skills may not have been identified despite the structured search strategy. In addition, direct evidence specific to cricket remains limited for several visual skills, with conclusions frequently informed by findings from related interceptive sports. Future research should validate the relative importance of individual visual skills in cricket, establish standardized assessment protocols, evaluate the effectiveness of targeted visual training interventions, and determine the position-specific visual demands of batters, bowlers, wicketkeepers, and fielders to support evidence-based talent identification and performance optimization.

CONCLUSIONS

This narrative review provides a synthesis of the visual skills considered potentially relevant to cricket performance and highlights their possible complementary roles in batting, bowling, and fielding. By organizing these visual abilities into two conceptual domains of visual hardware skills (fundamental, non-task-specific optometric and binocular visual abilities) and visual software skills (task-related gaze-control, visual-information-processing, perceptual-cognitive, and visuomotor abilities), this review offers a conceptual framework for examining the visual demands of cricket and for guiding future research, clinical assessment, and athlete development. The 14 visual skills identified may inform the future development and evaluation of cricket-specific visual assessment batteries and targeted vision training programs. Future research should establish standardized methods for evaluating these skills, determine their trainability and transfer to on-field performance, and clarify the position-specific visual requirements of batters, bowlers, wicketkeepers, and fielders. If future cricket-specific research confirms their predictive validity and trainability, assessment and targeted enhancement of selected visual skills may contribute to talent identification, player development, and performance in competitive cricket.

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REFERENCES

1. Crowther R (2023). 'Ecological dynamics of spin bowling in cricket: Adapting to environmental constraints (Doctoral dissertation, Queensland University of Technology)' (pp: 1-188). ID Code: 240365. Pure ID: 135682848. doi: 10.5204/thesis.eprints.240365. Available at: https://eprints.qut.edu.au/240365/ (Accessed: April 30, 2025).
2. Buscemi A, Mondelli F, Biagini I, Gueli S, D'Agostino A, Coco M. Role of Sport Vision in Performance: Systematic Review. J Funct Morphol Kinesiol. 2024;9(2):92. doi: 10.3390/jfmk9020092. PMID: 38921628; PMCID: PMC11204951.
3. Fogt JS, Fogt N. Studies of Vision in Cricket-A Narrative Review. Vision (Basel). 2023;7(3):57. doi: 10.3390/vision7030057. PMID: 37756131; PMCID: PMC10536906.
4. Lochhead L, Feng J, Laby DM, Appelbaum LG. Training vision in athletes to improve sports performance: a systematic review of the literature. Int Rev Sport Exerc Psychol. 2024:1-23. doi: 10.1080/1750984X.2024.2437385.
5. Nozari H, Arabameri E, Boroujeni ST. Effects of sports visual training on Eye-hand coordination and perception of depth among adults afflicted with impaired vision acuity. Arch Pharm Pract. 2020;11(4-2020):135-9. Link.
6. Dingirdan Gultekinler B, Uzlasir S, Işıkdemir E, Bayrakcı Tunay V, Wikstrom EA. The effects of stroboscopic vision training on physical performance in athletes: a systematic review. BMC Sports Sci Med Rehabil. 2025;18(1):78. doi: 10.1186/s13102-025-01459-x. PMID: 41419922; PMCID: PMC12895637.
7. Discombe R (2020). 'Watch the Ball: An Exploration of Gaze Behaviour While Batting in Cricket (Doctoral dissertation, Faculty of Business & Digital Technologies (BDT), University of Winchester)'. Available at: https://research.winchester.ac.uk/ws/portalfiles/portal/3982911/Russell_Discombe_PhD_Thesis_.pdf (Accessed April 30, 2025).
8. Brown T, Cook R, Gough LA, Khawaja I, McAuley ABT, Kelly AL. Exploring the Multidimensional Characteristics of Selected and Non-Selected White British and British South Asian Youth Cricketers: An Exploratory Machine Learning Approach. Youth 2024, *4*, 718-734. doi: 10.3390/youth4020048.
9. Sun Y, Jang D. Differences in predictive and prospective control strategies by batting skill level during an interception task. Front Psychol. 2025; 16:1671475. doi: 10.3389/fpsyg.2025.1671475. PMID: 41112561; PMCID: PMC12531235.
10. Singh U, Ramachandran AK, Doma K, Connor JD. Exploring the influence of task and environmental constraints on batting and bowling performance in cricket: A systematic review. Int J Sports Scie Coach. 2023;18(6):2292-305. doi: 10.1177/17479541231181549.
11. Brown T, McAuley AB, Khawaja I, Gough LA, Kelly AL. Talent identification and development in male cricket: A systematic review. J Expert. 2023;6(2):176-206. Link
12. Chathurangi AK, Silva RM, Withanage N, Jayasinghe CL. Impact ranking methodologies in limited-overs cricket: A systematic review of performance metrics. Int J Sports Scie Coach. 2025 ;20(3):1307-19. doi: 10.1177/17479541251321477.
13. Lochhead L, Feng J, Laby DM, Appelbaum LG. Visual Performance and Sports: A Scoping Review. J Sport Exerc Psychol. 2024 ;46(4):205-217. doi: 10.1123/jsep.2023-0267. PMID: 38815973.
14. Vera J, Redondo B, Molina R, Jiménez R, Dalton K. Relationship between dynamic visual acuity and multiple object tracking performance. Perception. 2022;51(8):539-548. doi: 10.1177/03010066221104281. Epub 2022 Jun 6. PMID: 35668637.
15. Nuthmann A, Canas-Bajo T. Visual search in naturalistic scenes from foveal to peripheral vision: A comparison between dynamic and static displays. J Vis. 2022;22(1):10. doi: 10.1167/jov.22.1.10. PMID: 35044436; PMCID: PMC8802022.
16. Wimshurst ZL (2012). 'Visual skills in elite athletes' (pp. 1-24). (A thesis submitted for the degree of Doctor of Philosophy, University of Surrey, United Kingdom). ProQuest Dissertations & Theses, 2012. U586535. Available at: https://www.proquest.com/openview/e5690977b8c3033e63f40ac96268c143/1?pqorigsite=gscholar&cbl=51922 (Accessed: April 30, 2025).
17. Erickson GB (2020). 'Sports vision: vision care for the enhancement of sports performance' (pp. 1-187). Second Edition, Elsevier Health Sciences; 2020. ISBN: 978-0-323-75543-6.
18. Atchison D, Mon-Williams M, Tresilian J, Stark LR, Strang NC. The value of training accommodative facility for ball sports. Clin Exp Optom. 1997;80(4):127-32. doi: 10.1111/j.1444-0938.1997.tb04867.x.

19. Presta V, Vitale C, Ambrosini L, Gobbi G. Stereopsis in Sports: Visual Skills and Visuomotor Integration Models in Professional and Non-Professional Athletes. Int J Environ Res Public Health. 2021;18(21):11281. doi: 10.3390/ijerph182111281. PMID: 34769799; PMCID: PMC8583573.
20. Sánchez-Tena MÁ, Rodríguez-Alonso X, Martinez-Perez C, Tornero-Aguilera JF, Clemente-Suárez VJ, Sanchez-Ramos C, Alvarez-Peregrina C. A Descriptive Analysis of Visual and Oculomotor Skills in Federated University Athletes. Appl Scie. 2025 ;15(1):418. doi: 10.3390/app15010418.
21. Laby DM, Appelbaum LG. Review: Vision and On-field Performance: A Critical Review of Visual Assessment and Training Studies with Athletes. Optom Vis Sci. 2021 ;98(7):723-731. doi: 10.1097/OPX.0000000000001729. PMID: 34328451.
22. Coetzee D, de Waal E. An Exploratory Investigation of the Effect of a Sports Vision Program on Grade 4 and 5 Female Netball Players' Visual Skills. Int J Environ Res Public Health. 2022;19(16):9864. doi: 10.3390/ijerph19169864. PMID: 36011502; PMCID: PMC9408284.
23. Christie CJ, Nellemann S, Davies T, Fourie JL, Davy JP. Sunglass tint does not impact the indoor catching performance of cricket fielders. Front Sports Act Living. 2023 Oct 31;5:1188270. doi: 10.3389/fspor.2023.1188270. PMID: 38022787; PMCID: PMC10644149.
24. Jorge J, Cymbron F, da Silva PH, Almeida Couto P. Comparative analysis of visual and cognitive performance in esports athletes and soccer players. Clin Exp Optom. 2025 Sep;108(7):838-843. doi: 10.1080/08164622.2024.2430637. Epub 2024. PMID: 39618292.
25. Millard L, Breukelman GJ, Burger T, Nortje J, Schulz J. Visual skills essential for rugby. Med Hypothesis Discov Innov Ophthalmol. 2023 May 31;12(1):46-54. doi: 10.51329/mehdiophthal1469. PMID: 37641672; PMCID: PMC10445309.
26. Sharma DP, Sharma S (2025). 'Visual Performance, Eye Diseases and Eye Protection in Cricket' (pp. 239-245). In: Olivier, B., Orchard, J.W. (eds) Cricket Sports Medicine. Springer, Singapore. doi: 10.1007/978-981-96-6321-7_24. Print ISBN: 978-981-96-6320-0; Online ISBN: 978-981-96-6321-7.
27. Vater C, Mann DL. Are predictive saccades linked to the processing of peripheral information? Psychol Res. 2023 ;87(5):1501-1519. doi: 10.1007/s00426-022-01743-2. Epub 2022 Sep 27. PMID: 36167931; PMCID: PMC10227171.
28. Tatara S, Toda H, Maeda F, Ito A, Handa T. Comparison of the Saccadic eye movement ability of female professional basketball players and non-athletes. Appl Scie. 2024 ;14(3):1108. doi: 10.3390/app14031108.
29. Ríder-Vázquez A, Gutiérrez-Sánchez E, Velasco-Olea D, Martinez-Perez C, Sánchez-González MC. Repeatability and Reproducibility of a Saccadic Eye Movement Time Test. J Clin Med. 2025;14(20):7170. doi: 10.3390/jcm14207170. PMID: 41156038; PMCID: PMC12565716.
30. Polikanova IS, Sabaev DD, Bulaeva NI, Panfilova EA, Leonov SV, Bugriy GS, Bespalov BI, Kruchinina AP. Analysis of Eye and Head Tracking Movements During a Puck-Hitting Task in Ice Hockey Players, Compared to Wrestlers and Controls. Psychol Russ. 2024 ;17(3):64-81. doi: 10.11621/pir.2024.0305. PMID: 39568524; PMCID: PMC11574569.
31. Mathe N, Millard L, Breukelman GJ, Mathunjwa M. Differences in visio-spatial intelligence between non-athletes and netball players. Front Sports Act Living. 2023; 5:1109967. doi: 10.3389/fspor.2023.1109967. PMID: 36891127; PMCID: PMC9986416.
32. Ren G, Huang Z, You S, Lin W, Huang T, Wang G, Lee JH. Enhancing motor skills and coordination with Visual-Haptic feedback in ball sport training. IEEE Access. 2025; 13: 49214 - 49231. doi: 10.1109/ACCESS.2025.3547159.
33. Kansagara R, Doshi D, Fumakiya M, Gevariya J, Shah M, Garg D. Integrating Dominant and Binocular Vision in Eye-Hand Coordination: A Systematic Review. In: 2025 International Conference on Intelligent Computing and Control Systems (ICICCS); 2025. pp. 806–814. IEEE. doi: 10.1109/ICICCS65191.2025.10985412
34. Vater C, Vukojević B, Williams AM (2025). 'Peripheral Vision in Sport'. In Gaze and Visual Perception in Sport 2025 Jan 31 (pp. 23-33), First Edition. Routledge. Available at: https://www.taylorfrancis.com/chapters/edit/10.4324/9781032708973-4/peripheral-vision-sport-christian-vater-bo%C5%BEo-vukojevi%C4%87-mark-williams (Accessed: April 30, 2025).
35. Sarpeshkar V, Abernethy B, Mann DL. Visual strategies underpinning the development of visual-motor expertise when hitting a ball. J Exp Psychol Hum Percept Perform. 2017 ;43(10):1744-1772. doi: 10.1037/xhp0000465. PMID: 28967781.
36. Ziv G, Lidor R, editors (2025). 'Gaze and visual perception in sport' (pp.1-51). Routledge; 2025 Jan 31. ISBN: 978-1-032-70896-6 (hbk). ISBN: 978-1-032-70898-0 (pbk). ISBN: 978-1-032-70897-3 (ebk). doi: 10.4324/9781032708973.
37. Evans M, Blood T, Bevins RL. Impact of acute mental fatigue on cricket-related performance measures in university level indoor cricket players. Front Sports Act Living. 2025; 7:1527696. doi: 10.3389/fspor.2025.1527696. PMID: 40521411; PMCID: PMC12162530.

38. Zhu R, Zheng M, Liu S, Guo J, Cao C. Effects of Perceptual-Cognitive Training on Anticipation and Decision-Making Skills in Team Sports: A Systematic Review and Meta-Analysis. Behav Sci (Basel). 2024;14(10):919. doi: 10.3390/bs14100919. PMID: 39457791; PMCID: PMC11505547.
39. Abbas K, Khan MI, Saeed M, Ahmed K, Wang H, Mahmood A. Front Pitch View Shot Extraction and Ball Tracking in Cricket Using Deep-Learning. IEEE Access. 2025; 13: 110941 - 110954. doi: 10.1109/ACCESS.2025.3583039.
40. Balbudhe P, Sharma R, Solanki S. Momentary sensor based cricket ball design for bowlers performance analysis. Multimedia Tools and Applications. 2025;84(26):31445-78. doi: 10.1007/s11042-024-20411-8.
41. Oldfield L (2025). 'The development of first-class cricket umpires: Holistic exploration into the demands, competencies, and learning of the role' (Doctoral dissertation, Leeds Beckett University). Available at: https://figshare.leedsbeckett.ac.uk/articles/thesis/The_development_of_first-class_cricket_umpires_Holistic_exploration_into_the_demands_competencies_and_learning_of_the_role/29355290. doi: 10.25448/lbu.29355290.
42. Mathe N, Millard L, Breukelman G, Mathunjwa M. A review of the essential visual skills required for netball: Beyond 20-20 optometry. Ann Appl Sport Scie. 2023;11(3): 0-11, e1179, 2023. doi: 10.61186/aassjournal.1179.
43. Murray NP, Lawton J, Rider P, Harris N, Hunfalvay M. Oculomotor Behavior Predict Professional Cricket Batting and Bowling Performance. Front Hum Neurosci. 2021; 15:768585. doi: 10.3389/fnhum.2021.768585. PMID: 35002657; PMCID: PMC8739967.
44. Marshall T, Runswick OR, Broadbent DP. "What we talk about is creating a probability": Exploring the interaction between the anticipation and decision-making processes of professional bowlers and batters in Twenty20 cricket. Psychol Sport Exerc. 2024; 70:102543. doi: 10.1016/j.psychsport.2023.102543. Epub 2023 Sep 29. PMID: 37778404.
45. Millard L, Shaw I, Breukelman GJ, Shaw BS. Factors affecting vision and visio-spatial intelligence (VSI) in sport: a review of the literature. Asian J Sports Med. 2020; 11(3): e101670. doi: 10.5812/asjsm.101670.
46. Botha B (2016). 'The Improvement of Netball Performance through a Visual Skills Training Programme' (pp. 1-24). (Master of Philosophy Dissertation, Faculty of Health Science, University of Johannesburg, South Africa). ProQuest Dissertations & Theses, 2016. 28287995. Available at: https://www.proquest.com/openview/55681a9dea92c9663710e3f574f3641a/1?pq-origsite=gscholar&cbl=2026366&diss=y (Accessed: April 30, 2025).
47. Kelly R, Roberts JW. Investigation into the dynamic visual acuity of skilled cricketers using a continuous motion task. J Sports Med Phys Fitness. 2021;61(5):753-759. doi: 10.23736/S0022-4707.20.11321-5. Epub 2020 Nov 4. PMID: 33146492.