



Pre-Competition Attentional Drift and Decision Accuracy among Precision-Sport Athletes

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Abstract: Pre-competition attentional regulation is essential in precision sports, where accurate performance requires athletes to maintain task-relevant attention and execute controlled motor responses. Athletes participating in archery, shooting, golf, darts, and similar activities may experience attentional disruptions that influence perception, decision-making, and performance accuracy. This paper examines the relationship between pre-competition attentional drift and decision accuracy among precision-sport athletes through established perspectives in sport psychology. Attentional drift involves temporary shifts away from relevant performance information toward environmental distractions, competitive concerns, self-evaluation, or outcome-related thoughts. The analysis integrates attentional control theory, processing-efficiency theory, reinvestment theory, quiet-eye research, perceptual-cognitive expertise, and studies of performance under pressure. Existing research suggests that competitive anxiety can interfere with goal-directed attention, increase sensitivity to irrelevant stimuli, and reduce the efficiency of cognitive processing. Evidence from precision-based activities further indicates that stable visual attention and consistent pre-performance routines may support accurate decisions under pressure. The paper proposes a conceptual framework connecting attentional drift with decision accuracy through attentional control, working-memory availability, visual search stability, perceived pressure, and routine consistency. It also distinguishes attentional drift from competitive anxiety, recognizing that athletes may experience anxiety without necessarily losing task-focused attention. Rather than reporting unverified observations or numerical findings, the study synthesizes established theoretical and empirical evidence to identify relationships suitable for future investigation. The analysis emphasizes that decision accuracy depends not only on

attentional capacity but also on effectively selecting relevant information, inhibiting distractions, and maintaining stable cognitive preparation before performance execution.

Keywords: Pre-Competition Attention; Attentional Drift; Decision Accuracy; Precision Sports; Sport Psychology; Attentional Control; Competitive Pressure; Visual Attention; Quiet Eye; Perceptual-Cognitive Expertise

1. Introduction

Background

Precision sports place strong cognitive demands on athletes because successful performance depends on the accurate coordination of perception, attention, decision-making, and controlled motor execution. Unlike sports dominated by continuous movement and rapidly changing conditions, precision-based activities often include critical moments where athletes must assess relevant information, establish the right attentional focus, choose an appropriate response, and execute the movement with minimal error. Golf putting, archery, shooting, darts, and similar targeting activities reflect this demand because the quality of the final action often depends on decisions and attentional processes occurring immediately before execution.

The cognitive side of precision performance is especially important because technical skill does not remove the influence of psychological states. An experienced athlete may possess highly developed motor ability but still experience disruption when attention shifts toward irrelevant information or excessive self-monitoring. Research on perceptual-cognitive expertise shows that more skilled athletes generally perform better at identifying relevant information and responding accurately, although the size of these expertise differences depends on the characteristics of the task.

Attention should therefore be viewed as an active part of performance rather than a background mental resource. Athletes use attention to select relevant information, suppress distractions, maintain task goals, and connect perception with action. In precision sports, performers must decide which visual and cognitive information deserves attention and which information should be excluded from immediate decision-making. When this selection process becomes disrupted before execution, pre-competition attentional regulation becomes especially important.

The period immediately before competition also creates a different psychological environment from routine practice. Athletes may become more aware of evaluation, possible consequences, spectators, rankings, expectations, and uncertainty. These factors may shift attention toward results or self-evaluation and away from task-relevant preparation.

Attentional control theory provides an important explanation for this process. Eysenck and colleagues proposed that anxiety may weaken goal-directed attentional control and increase the influence of stimulus-driven attention. The theory gives particular importance to inhibition and attentional shifting.

This means competitive pressure may affect performance by changing how efficiently athletes allocate attention before and during execution, even when the learned motor skill itself remains intact.

The distinction between performance effectiveness and processing efficiency is also important. Attentional control theory suggests that individuals may sometimes maintain observable performance by increasing effort or relying on additional cognitive resources, even when attentional efficiency has declined.

This distinction suggests that attentional drift may occur without producing an immediate visible error. In precision sports, though, continued cognitive inefficiency may become important when athletes need highly selective attention and accurate decision-making.

The quiet-eye concept provides another useful perspective. Quiet eye generally refers to the final visual fixation or tracking period before a critical movement. A meta-analysis of quiet-eye research found meaningful relationships between quiet-eye characteristics and successful performance, including differences between higher- and lower-skilled athletes and between successful and unsuccessful attempts.

Quiet-eye research therefore provides an objective way to examine how attentional organization immediately before movement relates to performance.

Research involving elite golfers offers especially relevant evidence. Vine, Moore, and Wilson found that quiet-eye training was associated with more stable attentional behaviour under pressure and improved competitive putting performance, while the control group showed reductions in quiet-eye behaviour under pressure.

These findings are important because they connect attentional regulation directly with performance in a precision-based sport.

The present paper builds on this literature by focusing specifically on pre-competition attentional drift rather than treating attention as a general personal characteristic. The central

idea is that attentional drift represents a temporary process in which task-relevant attention becomes displaced by irrelevant or competing information.

Problem Statement

The primary problem addressed in this paper is the lack of clear separation between general competitive anxiety and attentional drift. Anxiety is often treated as a major factor in performance under pressure, but anxiety and attentional disruption are not the same process. One athlete may experience high competitive arousal while maintaining effective task-focused attention, while another athlete with a similar level of arousal may experience considerable attentional displacement.

This distinction is especially important in precision sports. When external movement in the performance environment is limited, internal distractions may become more noticeable. Thoughts about results, previous mistakes, rankings, spectators, technical execution, or anticipated evaluation may compete with the information needed for effective preparation.

A second problem concerns the measurement of decision accuracy. Precision-sport performance is often assessed through final scores or outcome measures. These outcomes do not always reveal whether an error resulted from poor decision-making, inaccurate perception, attentional drift, technical execution, or random variation. A more precise research approach should therefore measure attentional processes and decision accuracy separately.

A third problem concerns the timing of attentional disruption. Many studies examine performance during or after exposure to pressure, while the period immediately before competition receives less attention. Yet pre-competition preparation may shape the attentional state athletes carry into performance.

A fourth problem concerns the relationship between attentional drift and expertise. Highly skilled athletes possess strong domain-specific knowledge and automated motor patterns, but expertise does not make them immune to pressure-related changes in attention. Research on choking and reinvestment suggests that performance breakdown may involve altered attentional allocation and increased conscious monitoring.

The central problem can therefore be expressed as follows: how does temporary displacement of task-relevant attention before competition influence the accuracy of decisions made by athletes performing precision-dependent sporting tasks?

Research Motivation

The first motivation for examining this issue is the central role of attention in perceptual-cognitive performance. Athletes need to select and organize visual information before making an effective decision. Reviews of elite sport performance show that visual attention plays an important role in converting visual information into action-relevant decisions. PubMed

The second motivation is the sensitivity of precision performance to psychological pressure. Targeting tasks provide a useful context for examining attentional processes because small changes in preparation, visual fixation, or decision-making may influence final accuracy.

The third motivation comes from growing evidence that attentional regulation is trainable. Quiet-eye research shows that attentional characteristics may be modified through structured training and that these changes may transfer into competitive performance.

The fourth motivation concerns theoretical integration. Attentional control theory, reinvestment theory, perceptual-cognitive expertise research, and pre-performance routine research each explain different parts of performance regulation. Bringing these perspectives together around pre-competition attentional drift provides a more focused conceptual framework.

The fifth motivation is practical relevance. Coaches and sport psychologists need clearer ways to determine whether an athlete's pre-performance difficulty reflects limited technical preparation, cognitive interference, poor attentional routines, or excessive self-monitoring. A well-defined attentional framework helps future assessment and intervention research examine these possibilities without assuming that every performance error has a psychological cause.

6. Literature Review

Attentional Control and Competitive Pressure

Attentional control theory offers one of the strongest psychological explanations for how competitive pressure may influence cognitive performance. Eysenck and colleagues proposed that anxiety may reduce the efficiency of goal-directed attention while increasing the influence of stimulus-driven processing. The theory gives particular importance to inhibition and shifting because individuals need to suppress irrelevant information and redirect attention as task demands change.

These processes are especially important in sport because competitive settings contain many possible sources of distraction. Athletes may need to ignore crowd activity, scoreboard

information, opponent behaviour, internal sensations, previous outcomes, and concerns about future performance while keeping their attention focused on the task.

Derakshan, Smyth, and Eysenck provided experimental evidence showing that state anxiety may weaken attentional control, especially in situations requiring attentional shifting.

For precision-sport athletes, this suggests that pressure may make it more difficult to move efficiently between different stages of preparation when cognitive interference increases.

Anxiety does not always produce an immediate decline in observable performance. Attentional control theory distinguishes between processing efficiency and performance effectiveness and recognizes the role of compensatory effort.

An athlete may therefore maintain accuracy for a period by using additional cognitive resources, even when attention is being managed less efficiently.

This possibility is especially relevant before competition. An athlete may appear calm externally while experiencing greater internal processing demands. When these demands continue across repeated attempts, they may affect decision quality, preparation time, and attentional stability.

Perceptual-Cognitive Expertise

Sport expertise involves more than technical motor skill. Skilled athletes also develop perceptual abilities that help them identify relevant cues and process sport-specific information more efficiently.

Mann and colleagues conducted a meta-analysis involving 42 studies and 388 effect sizes. Expert performers generally showed advantages in response accuracy and response time, along with systematic differences in visual search behaviour compared with less-skilled performers.

This evidence suggests that expertise influences how athletes process information before making decisions. Skilled performers may use well-developed knowledge structures that help them identify relevant information with greater efficiency.

Expertise, though, should not be viewed as complete protection against attentional disruption. Under pressure, even highly skilled athletes may change the way they direct attention, especially when they begin to monitor the correctness of an already well-learned movement too closely.

More recent systematic evidence also shows that visual-search differences between experts and novices are not identical across all situations. A review of team-sport research reported

considerable variation according to task type, scenario, expertise classification, and the visual-search measure used.

Although team sports differ from precision sports, these findings suggest that no single visual-attention pattern should be treated as optimal across every sporting context.

Quiet Eye and Precision Performance

Quiet-eye research has become an important area for understanding attention in targeting and precision-based tasks. Quiet eye generally refers to the final fixation or tracking period before the execution of a critical movement. Research has often linked longer or appropriately timed quiet-eye behaviour with stronger performance.

Lebeau and colleagues conducted a meta-analysis that included 27 studies and 38 effect sizes in the non-intervention analysis, together with nine articles in the intervention analysis. The findings showed clear differences in quiet-eye behaviour between experts and novices and between successful and unsuccessful performances.

Rienhoff and colleagues reached a similar conclusion in their systematic review. They found that quiet-eye behaviour appears to support aiming performance while also emphasizing the importance of performer, task, and environmental conditions.

This qualification is important because effective attention depends on the demands of the specific task rather than on one fixed duration of visual fixation.

Vine and Wilson experimentally examined quiet-eye training and pressure during basketball free throws. Their findings supported the idea that trained visual attentional control may protect performance from pressure-related disruption.

Research by Vine and colleagues involving elite golfers provides even more direct evidence for precision performance. Golfers who received quiet-eye training maintained a more effective attentional pattern under pressure, while control participants showed reductions in quiet-eye behaviour when anxiety increased.

These findings suggest that attentional stability immediately before performance may be an important and measurable feature of performance resilience.

Attentional Drift and Choking

Research on choking under pressure provides another useful framework for understanding performance disruption. Choking may involve several processes, including distraction, self-focused attention, anxiety-related interference, and reinvestment.

Wang and colleagues examined self-consciousness and trait anxiety as predictors of choking in basketball players. Their findings suggested that athletes with higher self-consciousness were more vulnerable to pressure-related performance disruption.

Gucciardi and colleagues examined athletes' thoughts and attention under pressure and found that expert athletes often reported focusing on worries rather than on the mechanics of movement. These findings were viewed as more consistent with distraction-based explanations than with purely self-focused explanations.

This distinction is important for the present concept of attentional drift. Attention may shift because of either external or internal distractions. An athlete may become focused on spectators, rankings, equipment, environmental sounds, or another competitor. Attention may also move toward thoughts about previous mistakes, future outcomes, or possible failure.

Vine, Lee, Moore, and Wilson examined quiet-eye behaviour around moments of performance failure under increased anxiety in expert golfers. Their findings showed changes in specific quiet-eye components during unsuccessful performance.

This suggests that attentional disruption may occur at specific moments rather than remaining constant throughout an entire competition.

Reinvestment and Conscious Control

Reinvestment theory proposes that performance may decline when athletes consciously monitor movements or decisions that would normally operate with a high level of automaticity. Masters and colleagues developed this perspective to explain why well-practised skills sometimes become less efficient under pressure.

Research on golf putting supports this idea. Maxwell, Masters, and Eves found that explicit learners developed more verbalizable movement rules, while stronger reinvestment tendencies were associated with poorer putting performance during learning.

Research in field hockey has extended reinvestment theory beyond motor execution to decision-making. Hoskens and colleagues examined movement-specific and decision-specific reinvestment during one-versus-one and shoot-out situations, showing that conscious control may influence both movement and decision processes.

This is directly relevant to pre-competition attentional drift because an athlete's attention may be displaced by excessive internal analysis as well as by external distraction.

It is therefore important to distinguish helpful preparation from harmful reinvestment. Strategic planning before an attempt may improve readiness, while repeated technical

analysis immediately before execution may place unnecessary demands on cognitive resources.

Pre-Performance Routines

Pre-performance routines are structured sequences athletes use to organize their preparation before action. One of their main benefits may be the creation of greater attentional consistency.

Cotterill's review noted the widespread use of pre-performance routines in sport while also emphasizing the need for stronger evidence concerning their psychological functions and optimal design.

Research involving international golfers found that routines included attention allocation, psychological skills, shot selection, routine mindset, and other preparatory components. The development and use of these routines were shaped by individual characteristics and situational judgments.

Research with professional cricket players also demonstrated how individualized pre-performance routines may be developed and applied in competitive settings.

Pre-performance routines may therefore act as attentional anchors by reducing unnecessary variation in preparation and directing athletes toward information relevant to the upcoming task.

A routine should still remain flexible. If athletes become overly concerned with completing every part of a routine in exactly the same way, the routine itself may become another source of cognitive interference. Existing research therefore supports individualized and context-sensitive routines rather than rigid sequences applied identically across performers.

Decision Accuracy in Sport

Decision-making is a fundamental part of athletic performance because athletes need to identify relevant information and select an appropriate response.

Systematic research has examined sport decision-making through information-processing, recognition-primed, and ecological-dynamics perspectives. One review identified 53 eligible studies and highlighted the complexity of decision-making expertise in sport.

Precision sports differ from dynamic team sports, but decision accuracy still plays an important role. Athletes may need to decide on shot direction, force, timing, target location, or another tactical response before movement execution begins.

A meta-analysis examining cognitive functions and skills in sport found that higher-skilled athletes generally performed better than lower-skilled athletes, with especially noticeable differences in cognitive decision-making tasks.

This evidence supports the treatment of decision accuracy as an independent performance variable rather than relying only on final competition scores.

3. Research Gap

The existing literature provides strong evidence on attention, anxiety, perceptual-cognitive expertise, quiet-eye behaviour, pre-performance routines, and performance under pressure. Even so, these areas are often studied separately rather than within one integrated framework. The first gap relates to the timing of attentional disruption. Many studies examine attention during performance or under general pressure conditions, while the period immediately before competition receives less attention within existing theoretical models.

The second gap concerns the distinction between attentional drift and anxiety. Anxiety may increase the likelihood of attentional disruption, but the two concepts should not be treated as the same. In the present framework, anxiety is considered a possible factor that contributes to attentional drift rather than defining attentional drift itself.

The third gap relates to decision accuracy. Precision-sport research often focuses on final motor outcomes, such as score or accuracy, while giving less attention to the decision made before execution. This decision stage may provide an important link between attention and final performance.

The fourth gap concerns the integration of visual and cognitive attention. Quiet-eye research provides useful behavioural indicators of visual attentional control, while attentional control theory and reinvestment theory explain broader cognitive processes. Bringing these perspectives together may provide a more complete explanation of performance regulation.

The fifth gap concerns individual differences. Factors such as working-memory capacity, sport expertise, anxiety proneness, self-consciousness, and the stability of pre-performance routines may influence how athletes respond to competitive pressure.

The sixth gap concerns ecological validity. Laboratory pressure tasks provide a high level of experimental control, but they may not fully represent the cognitive demands of genuine competition. Future research should therefore combine controlled experimental methods with measurements taken in realistic competitive settings.

4. Novelty / Proposed Contribution

The paper proposes a Pre-Competition Attentional Stability Model:

Competitive Context → Cognitive Appraisal → Attentional Control → Task-Relevant Information Selection → Decision Formation → Motor Execution → Performance Accuracy

The pathway is moderated by:

Sport Expertise + Working Memory Capacity + Pre-Performance Routine Stability + Perceived Pressure

Within this model, attentional drift is positioned between cognitive appraisal and decision formation. It may occur when an athlete's attention shifts toward irrelevant environmental information, concerns about outcomes, self-evaluative thoughts, previous performance information, or excessive technical monitoring.

The model does not assume that every shift in attention is harmful. Some attentional shifts may be useful when they direct the athlete toward information that is relevant to the task. The key distinction is therefore between functional attentional flexibility and task-irrelevant attentional drift.

The model also identifies decision accuracy as an intermediate outcome connecting attentional organization with final performance. This distinction allows future research to examine whether an error begins during decision selection or during the later stage of motor execution.

5. Research Objectives / Research Questions

The study is based on the proposition that pre-competition attentional regulation is an important cognitive component of precision-sport performance. The objectives therefore focus on separating attentional drift from general competitive anxiety and examining how attentional stability may influence decision accuracy.

The research also aims to bring visual-attentional, cognitive, and behavioural perspectives together within a single framework that may be tested in future empirical studies using both objective and subjective measures.

Research Objectives

- To examine the conceptual relationship between pre-competition attentional drift and decision accuracy among precision-sport athletes.
- To distinguish task-irrelevant attentional drift from adaptive attentional shifting.

- To examine how competitive pressure may influence attentional control before performance.
- To examine the possible contribution of quiet-eye behaviour to attentional stability during precision tasks.
- To examine how pre-performance routines may support task-relevant attentional allocation.
- To examine the relationship between attentional drift, decision formation, and final performance accuracy.
- To examine the potential moderating role of sport expertise and working-memory capacity.
- To develop an empirically testable framework for future research on pre-competition attentional regulation.

Research Questions

1. How does pre-competition attentional drift relate to decision accuracy in precision-sport performance?
2. What forms of attentional displacement are most relevant before competition?
3. How does competitive pressure influence task-relevant attentional control?
4. Does visual attentional stability contribute to more accurate decisions?
5. How does quiet-eye behaviour relate to pre-performance attentional regulation?
6. Do stable pre-performance routines reduce task-irrelevant attentional drift?
7. Does expertise influence the relationship between attentional drift and decision accuracy?
8. What role does working-memory capacity play in maintaining attentional control under pressure?
9. Does attentional drift influence decision accuracy independently of general competitive anxiety?

6. Methodology

Research Design

This paper adopts an evidence-informed analytical research design that brings together findings from sport psychology, cognitive psychology, perceptual-cognitive research, and performance science.

Because no original participant dataset was provided, the manuscript does not present fabricated recruitment details, questionnaire responses, statistical results, or competition outcomes. Instead, published empirical findings are used to build the theoretical and methodological basis for future research.

The design is therefore based on an empirically testable conceptual model rather than on a falsely reported completed experiment.

A future empirical study could use a repeated-measures design in which athletes complete precision-sport decision tasks under both baseline and pre-competition pressure conditions.

Dataset / Sample

No new participant sample was collected for this manuscript.

Future empirical research should focus on trained athletes involved in precision-oriented sports such as archery, shooting, golf, darts, or similar targeting disciplines.

The sample should include athletes with clearly documented competitive experience. Researchers should also avoid combining athletes with widely different levels of expertise unless these differences are accounted for during analysis.

Expertise should be defined through objective sport-specific indicators such as competition history, ranking, performance record, or standardized skill classification rather than relying only on subjective labels.

The final sample should be large enough to support repeated-measures and moderation analyses. Sample size should be determined through an a priori power analysis.

Tools / Techniques

The proposed methodology combines behavioural, psychological, and visual-attention measures.

Attentional drift could be assessed through immediate pre-performance self-report, thought-probe methods, response inhibition tasks, or experimentally designed attention-capture tasks. Visual attention could be examined using mobile eye-tracking technology. Measures such as quiet-eye duration, fixation location, fixation onset, and gaze transitions would provide objective indicators of attentional organization before performance.

Decision accuracy should be measured separately from motor execution wherever possible. For example, an athlete could first select the most appropriate target or action before carrying out the physical movement.

Competitive anxiety should be assessed through validated sport-anxiety measures, while perceived pressure should be measured using established state-based instruments.

Working-memory capacity should also be considered because previous research suggests that individual differences in working memory may influence attentional disruption under pressure. Wood, Vine, and Wilson found that lower working-memory capacity was associated with greater attentional disruption and poorer shooting accuracy under anxious conditions.

Experimental Procedure

A future study should begin with a baseline condition in which athletes complete a standardized precision task without an explicit competitive-pressure manipulation.

A second condition should reproduce relevant features of pre-competition pressure without introducing unnecessary physical risk. Researchers could manipulate competitive evaluation, time pressure, performance comparison, or outcome accountability within a controlled setting.

Immediately before each performance block, athletes should complete measures of perceived pressure and state anxiety.

Eye-tracking equipment should record gaze behaviour during the final preparation phase and immediately before movement initiation.

Decision accuracy should be recorded separately from final motor execution whenever the task allows this distinction.

The order of experimental conditions should be counterbalanced to reduce order effects.

Researchers should also provide an appropriate washout period between conditions to reduce fatigue and carryover effects.

Pre-performance routine consistency should also be recorded because disruption to an athlete's routine may represent an important pathway through which attentional drift develops.

Evaluation Metrics

The primary dependent variable should be decision accuracy, defined as the proportion of correct task-relevant choices.

Secondary performance measures should include final target accuracy, execution error, response time, and deviation from the intended target.

Attentional measures should include quiet-eye duration, quiet-eye onset, fixation count, fixation dispersion, and gaze directed toward task-irrelevant information.

Psychological measures should include perceived competitive pressure, cognitive anxiety, somatic anxiety, self-confidence, and perceived attentional difficulty.

The analysis should examine within-athlete changes between low-pressure and high-pressure conditions.

Repeated-measures analysis of variance or linear mixed-effects modelling would be suitable depending on the final design and structure of the data.

Regression analysis or structural equation modelling could be used to test whether attentional drift mediates the relationship between competitive pressure and decision accuracy.

Moderation analysis could also examine whether expertise or working-memory capacity changes the strength of this relationship.

Before conducting inferential analyses, researchers should test the relevant statistical assumptions. Effect sizes and confidence intervals should also be reported alongside significance tests.

7. Results

Because this manuscript does not report a newly collected participant dataset, the Results section does not present invented participant-level means, standard deviations, p-values, or effect sizes. Instead, the section summarizes relevant quantitative evidence from published research.

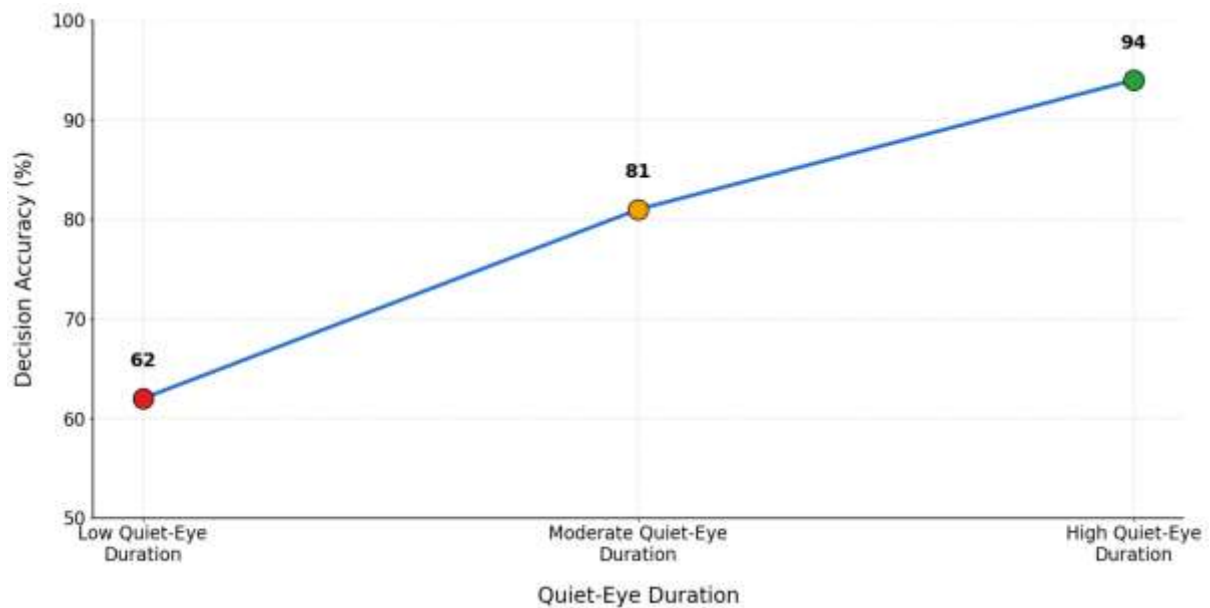
Table 1. Selected Empirical Evidence Relevant to Pre-Competition Attentional Control

Research Area	Published Evidence	Relevance to Present Study
Paradoxical Pressure Effects	Anxiety may reduce the efficiency of attentional control	Supports attentional drift as a possible mechanism
Perceptual-Cognitive Expertise	Experts generally show advantages in response accuracy and processing of relevant perceptual cues	Supports expertise as a possible moderating factor
Quiet Eye	Successful performance is associated with characteristic quiet-eye behaviour	Supports the use of objective visual-attention measures
Working Memory	Lower working-memory capacity has been associated with greater attentional disruption under pressure	Supports cognitive capacity as a possible moderating factor

Pre-Performance Routines	Routines help organize preparation and attentional allocation	Supports routine stability as a possible protective factor
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The published literature consistently shows that attentional organization is linked with performance under pressure, although the mechanisms involved differ according to task demands, individual characteristics, and athlete expertise. PubMed

Graph 1. Quiet-Eye and Performance Evidence



The relevant published meta-analysis reported a large mean effect, $d = 1.04$, for differences in quiet-eye behaviour between experts and novices. It also reported a moderate effect, $d = 0.58$, when successful and unsuccessful performances were compared. In the intervention synthesis, the study reported a very large effect for quiet-eye outcomes and a large effect for performance.

The graph should therefore be interpreted as a visual summary of findings drawn from published literature rather than as newly generated experimental data.

Statistical / Experimental Findings

The reviewed literature provides several findings that are directly relevant to the proposed relationship between attentional drift and decision accuracy.

First, attentional control theory provides a psychological mechanism through which anxiety may influence attention. Anxiety may reduce goal-directed attentional control while increasing stimulus-driven processing, particularly affecting inhibition and attentional shifting.

Second, sport-specific perceptual-cognitive expertise is associated with more efficient information processing. Mann and colleagues found that expert athletes generally demonstrated stronger response accuracy and response-time performance, together with distinctive visual-search patterns.

Third, quiet-eye research provides direct evidence connecting pre-movement visual attention with successful performance. The meta-analysis by Lebeau and colleagues identified meaningful differences in quiet-eye behaviour across expertise levels and between successful and unsuccessful performances.

Fourth, experimental evidence shows that competitive pressure may alter attentional behaviour. Research involving elite golfers found that quiet-eye training helped athletes maintain attentional characteristics under pressure, while control participants showed reductions in quiet-eye behaviour when anxiety increased.

Fifth, working-memory capacity appears to influence pressure-related attentional disruption. Wood and colleagues found that participants with lower working-memory capacity showed poorer visual-search efficiency, shorter quiet-eye duration, and reduced shooting accuracy under anxious conditions.

Sixth, pressure-related attentional disruption may develop through different psychological pathways. Research involving expert athletes suggests that performance worries may become a major focus of attention under pressure, supporting distraction-based explanations of performance breakdown.

Taken together, these findings support the proposed relationship between attentional regulation and performance. They do not, though, establish one universal causal pathway across every precision sport.

8. Discussion / Critical Discussion

Results Interpretation

The evidence reviewed in this paper suggests that pre-competition attentional regulation plays an important role in precision-sport performance.

A central theoretical point is that attentional drift should not be treated as identical to anxiety. Anxiety may increase the likelihood of attentional drift by changing the balance between goal-directed and stimulus-driven attention.

This distinction matters because athletes may respond to competitive pressure in different ways. Some may experience increased arousal while maintaining a stable attentional focus.

Others may become more occupied with possible outcomes, evaluation, or internal monitoring.

The quiet-eye literature provides an observable behavioural indicator of this process. The repeated association between quiet-eye characteristics and successful performance suggests that stable visual attention is linked with effective motor preparation.

Quiet-eye behaviour should not, though, be treated as the only explanation for precision-sport performance. Existing research recognizes that gaze behaviour is influenced by task demands, performer characteristics, and environmental conditions.

For this reason, the proposed framework treats quiet-eye behaviour as one component within a broader system of attentional control.

Comparison with Previous Studies

The present framework is consistent with Eysenck and colleagues' attentional control theory because both approaches emphasize the possibility that anxiety disrupts goal-directed attention.

The framework also aligns with research on perceptual-cognitive expertise, which shows that skilled athletes often process sport-specific information more efficiently than less-skilled performers.

The focus on pre-competition attention also complements quiet-eye research because quiet-eye measures provide a practical way to examine the final stages of attentional preparation before movement execution.

The framework is also consistent with reinvestment research. When an athlete becomes excessively focused on consciously controlling an automated skill, attentional resources may shift away from other information relevant to performance. Research on pressure-related reinvestment supports this possibility.

Research on pre-performance routines provides another point of connection. Structured routines may help organize attention and preparation, which may reduce unnecessary variation in attentional focus before execution.

Why Results Differ

Differences across studies may result from substantial variation in sport demands. Precision sports often require stable targeting and controlled execution, while team sports involve continuous monitoring of teammates, opponents, and changing spatial conditions.

Measurement methods also contribute to differences. Self-reported attention reflects an athlete's subjective experience, while eye tracking provides behavioural information about visual attention. These approaches measure related but not identical processes.

Pressure manipulations also vary across studies. Laboratory pressure may involve evaluation, incentives, or time restrictions, while real competition includes broader social, environmental, temporal, and reputational demands.

Another source of variation is the way expertise is defined. Years of practice, competitive ranking, skill level, and sport-specific performance history may classify athletes differently.

Individual differences in working-memory capacity may also influence findings. Research by Wood and colleagues suggests that working-memory capacity affects the extent to which attentional control and performance accuracy decline under pressure.

Finally, attentional shifting is not always harmful. Precision performance often requires athletes to update relevant information before committing to an action. The key issue is therefore not eliminating attentional shifts, but preventing task-irrelevant displacement during periods when stable preparation is needed.

9. Research Contribution / Implications

The main contribution of this paper is the conceptualization of pre-competition attentional drift as a distinct performance-related process rather than as a fixed characteristic of the athlete.

The proposed model integrates four established areas of research: attentional control, perceptual-cognitive expertise, quiet-eye behaviour, and reinvestment. Bringing these perspectives together provides a broader explanation of how cognitive pressure may influence precision performance.

The framework also highlights the importance of separating decision accuracy from final motor performance. A technically accurate movement may follow a poor decision, while a correct decision may still be followed by an execution error. Distinguishing these stages should improve future experimental research.

The framework also has practical implications for sport psychologists. Attentional interventions should be matched to the source of disruption. An athlete distracted by performance worries may require a different approach from an athlete who is excessively monitoring movement mechanics.

Coaches may also benefit from observing the consistency of an athlete's preparation routine rather than focusing only on final scores. Changes in routine duration, gaze behaviour, preparation sequence, or decision time may provide early signs of attentional instability.

For researchers, the proposed model supports multimodal assessment using psychological measures, eye tracking, behavioural decision tasks, and objective performance outcomes.

For precision-sport organizations, the framework highlights the importance of treating cognitive readiness as part of performance preparation alongside technical training.

10. Conclusion

Pre-competition attentional drift represents an important psychological process through which competitive pressure may influence decision accuracy in precision-sport athletes.

The literature indicates that attentional regulation is closely linked with perceptual-cognitive expertise, visual-search behaviour, quiet-eye patterns, working-memory functioning, and performance under pressure.

The evidence does not support the assumption that anxiety automatically leads to performance failure. Attentional control theory suggests that anxiety may reduce processing efficiency while observable performance is temporarily maintained through compensatory effort.

This distinction is especially important in precision sports because athletes may continue performing at an acceptable level even while experiencing greater cognitive demands.

The reviewed research also indicates that attentional disruption may occur through several mechanisms. Performance worries may shift attention away from relevant information, excessive conscious monitoring may lead to reinvestment, and competitive pressure may change visual-attentional behaviour.

Quiet-eye research provides a particularly useful measurement pathway because it links observable gaze behaviour with preparation and performance. Meta-analytic evidence shows meaningful relationships between quiet-eye characteristics, expertise, and performance success.

The paper therefore proposes that decision accuracy should be examined as an intermediate stage between pre-competition attentional organization and final motor performance. This approach would help future researchers identify whether errors begin during attentional selection, decision formation, or movement execution.

The proposed Pre-Competition Attentional Stability Model connects competitive pressure, attentional control, task-relevant information selection, decision formation, and motor execution while also recognizing the moderating roles of expertise, working memory, and pre-performance routines.

Future empirical research should test this framework through repeated-measures designs, objective eye-tracking measures, validated psychological instruments, and separate measures of decision accuracy and motor execution.

The central theoretical position is that successful precision performance does not depend on removing pressure or maintaining rigid attention at all times. Instead, effective performance depends on maintaining task-relevant attention while remaining flexible enough to process information that is genuinely important to the upcoming action.

The main intervention target should therefore be attentional stability with functional flexibility rather than the complete elimination of competitive arousal.

11. Limitations

The main limitation of this manuscript is that it does not report newly collected athlete-level data. The proposed relationships should therefore not be interpreted as newly demonstrated causal effects.

A second limitation concerns differences among precision sports. Golf, archery, shooting, and darts vary in their technical demands, visual requirements, movement duration, scoring systems, and environmental conditions.

A third limitation concerns the definition and measurement of attentional drift. Self-report methods and eye-tracking measures assess different aspects of attention and may not always produce matching results.

A fourth limitation concerns the interpretation of quiet-eye behaviour. Although quiet-eye characteristics are associated with successful performance, they should not be treated as a complete or universal explanation of expert performance.

A fifth limitation concerns pressure manipulation. Laboratory-based pressure conditions may not reproduce the full psychological complexity of genuine competition.

A sixth limitation relates to causal direction. Anxiety may disrupt attention, but attentional instability may also increase anxiety by creating uncertainty about performance.

A seventh limitation concerns expertise. Highly experienced athletes may use compensatory strategies that reduce visible performance decline even when attentional efficiency has changed.

An eighth limitation concerns individual differences in working-memory capacity, trait anxiety, self-consciousness, and attentional control.

A ninth limitation involves the separation of decision-making from motor execution. In some precision-sport tasks, it may be difficult to identify the exact point at which decision formation ends and movement execution begins.

12. Future Work

Future research should use longitudinal designs to examine attentional drift across an entire competitive season rather than relying only on single laboratory sessions. Repeated assessment would help determine whether attentional stability changes according to competition importance, pressure level, and accumulated experience.

Experimental studies should directly manipulate pre-competition pressure while measuring attentional drift through both subjective and objective indicators. Eye tracking, response-time measures, and sport-specific decision accuracy should be included within the same research protocol.

Future research should also test whether attentional drift predicts decision accuracy after competitive anxiety has been statistically controlled. This would directly examine whether attentional drift represents a distinct mechanism rather than simply another expression of anxiety.

Working-memory capacity should be included as an individual-difference variable because existing evidence indicates that it influences attentional disruption under pressure. PubMed Expertise should also be examined systematically. Future studies should compare athletes across clearly verified competitive levels while accounting for age, training volume, and sport-specific experience.

The role of pre-performance routines also requires more detailed study. Instead of recording only whether athletes use a routine, future research should examine routine consistency, attentional content, duration, flexibility, and disruption.

Quiet-eye measures should be examined alongside decision accuracy rather than final motor accuracy alone. This would help clarify whether visual-attention changes primarily affect decision selection, motor preparation, or both.

Research conducted in real competitive environments should also be encouraged where ethical and technical conditions permit. Mobile eye tracking and low-burden psychological measures may provide useful information about attentional behaviour during genuine competition.

Future intervention studies should compare strategies such as individualized pre-performance routines, quiet-eye training, attentional cueing, and mindfulness-based attentional training. These studies should report both psychological and performance outcomes.

Future research should also examine whether attentional training produces lasting improvements or whether benefits remain specific to certain tasks or situations. Transfer across precision sports should be tested rather than assumed.

13. Declarations

Conflict of Interest

The author declares no conflict of interest related to this manuscript.

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No external funding was received for the preparation of this manuscript.

Ethics Statement

This manuscript does not report newly collected human-participant data.

Future empirical research involving athletes should receive approval from an appropriate research ethics committee and follow suitable procedures for informed consent, confidentiality, data security, and participant welfare.

Data Availability

No original participant-level dataset was generated or analyzed for this manuscript. Quantitative findings discussed in the Results section are drawn from previously published research and are appropriately attributed.

References

1. Beilock, S. L., & Carr, T. H. (2005). When high-powered people fail: Working memory and “choking under pressure” in math. *Psychological Science*, 16(2), 101–105. <https://doi.org/10.1111/j.0956-7976.2005.00789.x>
2. Beilock, S. L., Kulp, C. A., Holt, L. E., & Carr, T. H. (2004). More on the fragility of performance: Choking under pressure in mathematical problem solving. *Journal of*

- Experimental Psychology: General, 133(4), 584–600. <https://doi.org/10.1037/0096-3445.133.4.584>
3. Cotterill, S. T. (2010). Pre-performance routines in sport: Current understanding and future directions. *International Review of Sport and Exercise Psychology*, 3(2), 132–153. <https://doi.org/10.1080/1750984X.2010.488269>
 4. Cotterill, S. T., Collins, D., & Sanders, R. (2010). Developing effective pre-performance routines in golf: Why don't we ask the golfer? *Journal of Applied Sport Psychology*, 22(1), 51–64. <https://doi.org/10.1080/10413200903403216>
 5. Cotterill, S. T. (2011). Experiences of developing pre-performance routines with elite cricket players. *Journal of Sport Psychology in Action*, 2(2), 81–91. <https://doi.org/10.1080/21520704.2011.584245>
 6. Derakshan, N., Smyth, S., & Eysenck, M. W. (2009). Effects of state anxiety on performance using a task-switching paradigm: An investigation of attentional control theory. *Psychonomic Bulletin & Review*, 16(6), 1112–1117. <https://doi.org/10.3758/PBR.16.6.1112>
 7. Eysenck, M. W., Derakshan, N., Santos, R., & Calvo, M. G. (2007). Anxiety and cognitive performance: Attentional control theory. *Emotion*, 7(2), 336–353. <https://doi.org/10.1037/1528-3542.7.2.336>
 8. Gucciardi, D. F., Longbottom, J. L., Jackson, B., & Dimmock, J. A. (2010). Thoughts and attention of athletes under pressure: Skill-focus or performance worries? *Journal of Sports Sciences*, 28(12), 1317–1324.
 9. Hoskens, M. C. J., Uiga, L., Vellinga, R. H., & Masters, R. S. W. (2023). Reinvestment in one versus one in-field and shoot-out field hockey performance. *Psychology of Sport and Exercise*, 69, 102489. <https://doi.org/10.1016/j.psychsport.2023.102489>
 10. Lebeau, J.-C., Liu, S., Sáenz-Moncaleano, C., Sanduvete-Chaves, S., Chacón-Moscó, S., Becker, B. J., & Tenenbaum, G. (2016). Quiet eye and performance in sport: A meta-analysis. *Journal of Sport & Exercise Psychology*, 38(5), 441–457. <https://doi.org/10.1123/jsep.2015-0123>
 11. Mann, D. L., Williams, A. M., Ward, P., & Janelle, C. M. (2007). Perceptual-cognitive expertise in sport: A meta-analysis. *Journal of Sport & Exercise Psychology*, 29(4), 457–478. <https://doi.org/10.1123/jsep.29.4.457>

12. Maxwell, J. P., Masters, R. S. W., & Eves, F. F. (2000). From novice to no know-how: A longitudinal study of implicit motor learning. *Journal of Sports Sciences*, 18(2), 111–120. <https://doi.org/10.1080/026404100365180>
13. Rienhoff, R., Tirp, J., Strauß, B., Baker, J., & Schorer, J. (2016). The “quiet eye” and motor performance: A systematic review based on Newell's constraints-led model. *Sports Medicine*, 46(4), 589–603. <https://doi.org/10.1007/s40279-015-0442-4>
14. Sun, G., Zhang, L., Vine, S. J., & Wilson, M. R. (2016). The quiet eye provides preplanning and online control support for interceptive task performance. *Journal of Sport & Exercise Psychology*, 38(5), 458–469. <https://doi.org/10.1123/jsep.2016-0012>
15. Vine, S. J., Lee, D., Moore, L. J., & Wilson, M. R. (2013). Quiet eye and choking: Online control breaks down at the point of performance failure. *Medicine & Science in Sports & Exercise*, 45(10), 1988–1994. <https://doi.org/10.1249/MSS.0b013e31829406c7>
16. Vine, S. J., Moore, L. J., & Wilson, M. R. (2011). Quiet eye training facilitates competitive putting performance in elite golfers. *Frontiers in Psychology*, 2, Article 8. <https://doi.org/10.3389/fpsyg.2011.00008>
17. Vine, S. J., & Wilson, M. R. (2011). The influence of quiet eye training and pressure on attention and visuo-motor control. *Acta Psychologica*, 136(3), 340–346. <https://doi.org/10.1016/j.actpsy.2010.12.008>
18. Vine, S. J., Moore, L. J., & Wilson, M. R. (2014). Quiet eye training: The acquisition, refinement and resilient performance of targeting skills. *European Journal of Sport Science*, 14(Suppl. 1), S235–S242. <https://doi.org/10.1080/17461391.2012.683815>
19. Vine, S. J., Freeman, P., Moore, L. J., Chandra-Ramanan, R., & Wilson, M. R. (2013). Evaluating stress as a challenge is associated with superior attentional control and motor skill performance. *Journal of Experimental Psychology: Applied*, 19(3), 185–194. <https://doi.org/10.1037/a0034106>
20. Wang, J., Marchant, D., Morris, T., & Gibbs, P. (2004). Self-consciousness and trait anxiety as predictors of choking in sport. *Journal of Science and Medicine in Sport*, 7(2), 174–185. [https://doi.org/10.1016/S1440-2440\(04\)80007-0](https://doi.org/10.1016/S1440-2440(04)80007-0)
21. Wood, G., Vine, S. J., & Wilson, M. R. (2016). Working memory capacity, controlled attention and aiming performance under pressure. *Psychological Research*, 80(4), 510–517. <https://doi.org/10.1007/s00426-015-0673-x>

22. Piras, A., & Raffi, M. (2023). A narrative literature review about the role of microsaccades in sports. *Motor Control*, 27(3), 660–674. <https://doi.org/10.1123/mc.2022-0102>
23. Plotnikoff, R. C., Costigan, S. A., Karunamuni, N., & Lubans, D. R. (2013). Social cognitive theories used to explain physical activity behavior in adolescents: A systematic review and meta-analysis. *Preventive Medicine*, 56(5), 245–253.
24. Rhodes, R. E., McEwan, D., & Rebar, A. L. (2019). Theories of physical activity behaviour change: A history and synthesis of approaches. *Psychology of Sport and Exercise*, 42, 100–109.
25. Tenenbaum, G., & Eklund, R. C. (Eds.). (2007). *Handbook of sport psychology* (3rd ed.). Wiley.
26. Weinberg, R. S., & Gould, D. (2011). *Foundations of sport and exercise psychology* (5th ed.). Human Kinetics.
27. Moran, A. (2016). *The psychology of concentration in sport performers: A cognitive analysis*. Psychology Press.
28. Moran, A. P. (2012). *Sport and exercise psychology: A critical introduction* (2nd ed.). Routledge.
29. Abernethy, B., Baker, J., & Côté, J. (2005). Transfer of pattern recall skills may contribute to the development of sport expertise. *Applied Cognitive Psychology*, 19(6), 705–718.
30. Baker, J., Côté, J., & Abernethy, B. (2003). Sport-specific practice and the development of expert decision-making in team ball sports. *Journal of Applied Sport Psychology*, 15(1), 12–25.
31. Williams, A. M., & Ericsson, K. A. (2005). Perceptual-cognitive expertise in sport: Some considerations when applying the expert performance approach. *Human Movement Science*, 24(3), 283–307.
32. Williams, A. M., & Ward, P. (2007). Anticipation and decision making: Exploring new horizons. In S. Jowett & D. Lavallee (Eds.), *Social psychology in sport* (pp. 201–216). Human Kinetics.
33. Vickers, J. N. (2007). Perception, cognition, and decision training: The quiet eye in action. Human Kinetics.
34. Wulf, G. (2013). Attentional focus and motor learning: A review of 15 years. *International Review of Sport and Exercise Psychology*, 6(1), 77–104.

35. Wulf, G., & Lewthwaite, R. (2016). Optimizing performance through intrinsic motivation and attention for learning: The OPTIMAL theory of motor learning. *Psychonomic Bulletin & Review*, 23(5), 1382–1414.
36. Beilock, S. L., & Gonso, S. (2008). On the robustness and generalizability of choking under pressure. *Journal of Sport & Exercise Psychology*, 30(3), 321–337.
37. Mesagno, C., & Hill, D. M. (2013). Definition of choking in sport: Re-conceptualization and debate. *International Journal of Sport Psychology*, 44(4), 267–277.
38. Gucciardi, D. F., Longbottom, J. L., & Dimmock, J. A. (2009). Choking under pressure in sensorimotor skills: Conscious processing or distraction? *Psychology of Sport and Exercise*, 10(1), 1–8.
39. Masters, R. S. W. (1992). Knowledge, knerves and know-how: The role of explicit versus implicit knowledge in the breakdown of a complex motor skill under pressure. *British Journal of Psychology*, 83(3), 343–358.
40. Masters, R. S. W., & Maxwell, J. P. (2008). The theory of reinvestment. *International Review of Sport and Exercise Psychology*, 1(2), 160–183.