

Opinion Paper

Capturing the 'expert's eye': A perspective on developing a better understanding and implementation of subjective performance evaluations in team sports

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Subjective evaluations of athletic performance are an important part of decision making across sporting organisations. Based on their expertise and intuition, coaches select their starting line-ups, scouts recommend or discourage teams from signing new potential players, and academy directors decide which players should move up or out of a team's academy system. While this intuitive evaluation of performance occurs constantly throughout sport, little attention has been given to how this process can be more formally designed, implemented, and assessed to capture these expert evaluations of performance more effectively and thereby better inform decision making within sports organisations. In this opinion paper, the discrepancy between how often subjective evaluations are used in practice and how little research exists regarding their development, implementation, and effectiveness is examined. To assist in moving the sport science field forward, this paper will attempt to define subjective performance evaluations, describe the potential benefits that sporting organisations may get from using them, detail existing and potential uses for these measures, provide a framework for understanding how subjective data collection, and call upon the academic and applied sport community to drive the subjective evaluation field further.

INTRODUCTION

Subjective evaluation of performance is widely practiced in sport. Informally, these assessments fuel conversations in which fans denounce "*the worst player they've ever seen*" and they fill sports-radio talk shows where pundits and talk-show guests declare their subjective opinions on a team's merits or failings. More formally, coaches' subjective evaluations of their roster influence starting line-up selections and subsequent playing time decisions; a scout's subjective opinion of a player is often vital in the decision to sign an athlete; and an academy director's subjective evaluation of youth players can guide decisions around player promotion or dismissal from an academy system.^{1,2}

The validity and reliability of a subjective evaluation may vary dramatically according to the qualifications and expertise of the person who performs the assessment (e.g. fan/parent, coach/scout), in the formality and 'stakes' of the assessment (e.g. living room conversation, radio talk show, line-up selection, player recruitment), and in the characteristics of the evaluation tool itself. Subjective evaluation is clearly a cornerstone of the sporting world. Despite this, to our knowledge no peer-reviewed literature exists in the sport science literature that systematically de-

scribes how these evaluations are being used, or how they can be strategically developed and evaluated.

Contrasted with the dearth of such a literature in sports science, other disciplines including psychology,³ business,⁴ and education⁵ all provide examples of how subjective performance evaluations may be developed, implemented, and evaluated. While a full review of this evidence base is outside the scope of this current paper, these disciplines provide a roadmap for where the sport science discipline may progress, providing that there is a willingness to use subjective performance evaluations critically and effectively. To describe what navigating this roadmap may look like in a sporting context, this perspective paper articulates five primary objectives, which are:

1. Define "subjective performance evaluations"
2. Describe the potential benefits of subjective performance evaluations
3. Describe existing and potential uses of subjective performance evaluations for organisations team-based sport
4. Present a framework to consider how the data generation process for subjective performance evaluations can be considered alongside objective performance measures.

5. Call on the academic and applied community to further investigate and consider how subjective evaluations may be developed and implemented effectively.

WHAT ARE "SUBJECTIVE PERFORMANCE EVALUATIONS"?

Broadly, we define a *subjective performance evaluation* as any measure that captures human perception of a sport performance construct.

First, 'performance evaluation'. Sport performance can be complex and challenging to evaluate. In some instances, performance can be quantified objectively. Who can throw the javelin the farthest? Even in these 'simple' cases (e.g. single-athlete events, closed environments), the question of which athlete is 'better' may be complicated by several factors such as the athlete's consistency – does one throw in training make an athlete the best? What is their ability to perform in competition contexts under pressure? How do they compare to reasonable contextual counterparts such as athletes of the same sex, age, and competition level? These challenges are compounded when we consider more dynamic, open environment, team invasion sports like football (soccer). Ultimately, sport performance is a multifaceted 'construct' that no single measure can capture,⁶ with underlying component constructs from the physical, technical, psychological, and tactical domains.⁷ A performance evaluation then, is any measurement taken with the aim of understanding these component constructs or overall athlete performance (Table 1).

Second, 'subjective'. This paper does not imply that this measurement category is inferior to other 'objective' performance measures. Rather, 'subjective' differentiates the primary origin of these measurements. On the extreme ends of the spectrum, subjective measures try to directly capture some aspect of human perception, while objective measures are generally perception-agnostic. It is important to recognise that human judgment is a part of both "objective" and "subjective" measures. In the objective case, human judgment is in the input (e.g. designing the technology/sensors that collect data). In the subjective case, human judgment is the output itself. The challenge of this paper is how to capture that output effectively.

Sometimes, distinguishing between objective data and subjective data is simple. Optical tracking data can easily be considered "objective", while journalist ratings of player performance are clearly "subjective". Other times, these distinctions aren't so clear. Soccer event data (which many match statistics are based on), relies on a human coder recording match statistics, like player X recording a pass, player Y shooting the ball, etc. In this case, practitioners may treat event data (passes in the match, shots on target, etc.) as "objective", but it is important to consider that there is a subjective component where the coder must judge whether an event is a pass, clearance, shot, block, and these judgements may not be perfectly consistent across coders. If that same coder also had to judge and record the quality of that pass, then this data could be considered as primarily "subjective" in nature, with an objective component.

'Subjective performance evaluation' is a broad definition that encompasses many performance constructs, most of which will also have associated objective measures. Consider a soccer player's 'endurance' as a construct. Knowing a player's endurance may help a team to decide if the player is ready to play a full 90-minute soccer match.⁸ Many may suggest that one can measure endurance "objectively" in a laboratory setting (e.g. VO_2 max).⁹ However, we could also ask a fitness coach to "subjectively" rate an athlete's endurance on a scale.¹⁰ These may not align perfectly. In the limited work that has compared such measures, agreement between subjective and objective indicators is not very high.¹⁰ While it may be tempting to immediately consider the laboratory test as superior, it is important to consider sport performance as a multifaceted construct and appreciate where a VO_2 max test fits into its evaluation (Figure 1).¹¹ A VO_2 max test may be the gold standard for assessing an athlete's maximal oxygen uptake and utilisation, but it does not necessarily accurately reflect to their ability to utilise their fitness within match play. The VO_2 max test is also influenced by the athlete's motivation to perform maximally in a laboratory environment, often on a bike. In this example, a fitness coaches' subjective evaluation may be more contextually relevant to how the athlete performs in competition, potentially providing a free, less invasive, and in some ways a more valid endurance performance measure. The more complex the construct, the more appropriate a subjective measure may become.¹² In this example, asking a fitness coach to evaluate 'endurance' makes more sense than asking the coach to predict an athlete's maximal oxygen utilisation.

WHAT ARE SOME OF THE BENEFITS TO SUBJECTIVE PERFORMANCE MEASURES?

We believe that valid and reliable subjective performance evaluations are important, particularly in the context of team sports. Below we highlight four reasons for this opinion – two that focus on the type of data that can be captured, and two that revolve around their implementation benefits.

First, subjective performance evaluations may capture information about complex constructs that cannot be easily quantified by many traditional objective measures (e.g., tactical decision making, consistency, attitude, motivation, and work ethic). An athletes' soft skills, i.e. the way they perform mentally under pressure, and their tactical understanding and commitment to the team's principles are all very difficult to evaluate with traditional objective data streams such as event/tracking data. However, some of these complex constructs may be more appropriately evaluated by an individual such as a coach who observes the way the athlete competes and understands what the expectations are. Similar benefits of subjective monitoring have been described in athletes' wellness monitoring, given that athletes are complex, adaptive systems.¹²

Second, subjective performance evaluations may form the basis of the expert's eye.^{1,13} It is common to hear and see coaches' intuitions about athletes they believe 'have it'.

Table 1. Differentiating 'subjective' and 'objective' performance measures.

	Subjective Performance Measure	Objective Performance Measure
Definition	An evaluation of an athlete's or team's performance based on human perception and judgment.	An evaluation of an athlete's or team's performance based on any measurable metric other than human perception.
Advantages	<ul style="list-style-type: none"> Affordable. May capture complex or hard-to-quantify metrics (e.g. tactical performance). May capture the 'expert's eye' May encourage staff and player buy-in. 	<ul style="list-style-type: none"> Usually less influenced by human bias. May be automated and enable more seamless data collection with less time required from staff/players.
Disadvantages	<ul style="list-style-type: none"> May be largely influenced by human bias. May be challenging to ensure inter- and intra-tester reliability without scale consistency, education. Care must be taken to ensure scores reflect performance instead of other confounding factors i.e. validity. Requires time from staff or players to complete the evaluations. Requires critical thought and time to design and evaluate measures. 	<ul style="list-style-type: none"> May be limited to their context (e.g. match event data cannot capture training performances, Global Positioning System (GPS) data may not be allowed in match play). No technology is perfect, so measurement error will influence scores on these outcomes. Can be very difficult to evaluate some more complex performance constructs like mental performance and tactical execution without advanced modelling. May be expensive and thus more difficult to implement at lower-resourced/grassroots clubs.



Figure 1. A simplified visual breakdown of where endurance fits into the realm of overall athlete performance.

Sometimes these athletes are deemed by a coach, scout, or other individual to have an 'x factor' that differentiates them from their peers, or that they have potential that has not yet been realised. Recently, researchers have suggested that subjective performance evaluations may capture these intuitions based on experiential knowledge, temporal factors, seeing the athlete in context, and knowing what the coach can work with.¹⁴ While it is not unusual for a coach or scout to change their mind from one occasion to the next, having a formal measure in place means you can record these changes and fluctuations, using them as signals to understand. Implementing more formalised subjective measures may lead to more transparent and accountable use of performance evaluations, bolstering their defensibility and improving organisation's ability to make inferences from practitioners' expertise.

Third, subjective performance evaluations may be very cost effective. From spreadsheets to open-source platforms, users can easily record evaluation responses for a minimal cost. While many companies that provide objective performance data (e.g. GPS, tracking data) do so with a hefty price

tag, subjective performance evaluations may capture some analogous information, in a highly affordable manner.

Finally, implementation science recognises the importance of involvement from those involved in the process.^{15,16} Engaging directly with practitioners and capturing their perceptions about performance constructs that they deem valuable for performance may encourage acceptance and support for implementation. Standardising subjective performance evaluations also provides a common ground and common language for practitioners to speak and a platform in which to discuss their varying opinions.

WHAT ARE THE EXISTING AND POTENTIAL USES OF SUBJECTIVE PERFORMANCE EVALUATIONS?

Subjective evaluations can be used to measure any relevant performance related constructs and by any individual who possesses adequate contextual knowledge. For example, they may be used to capture and quantify scouts' opinions as they evaluate potential future athletes, to evaluate academy staff's feelings toward athletes' future potential, to assess a coaches' perceptions of athletes' performance qual-

Table 2. Objective and subjective evaluation examples within several performance domains.

Performance Domain	Objective Example	Subjective Example
Overall	Valuing Actions by Estimating Probabilities ²¹	Player Rankings (e.g. MVP vote)
	Inside Football Player Ratings ²²	Australian Football League Player Ratings ²²
Physical	Player maximum velocity measured by GPS or optical tracking.	Fitness-coach ranked 'speed'. ¹⁰
	Yo-Yo Intermittent Recovery Test ²³ 30:15 Intermittent Fitness Test ²⁴	Fitness-coach rating of 'endurance' ¹⁰
Technical	Pass completion over expected pass % ^{25,26}	Scout's rating of passing ability. ²⁷
Tactical	Formation adherence % ²⁸	Head coach evaluation of team's adherence to game model formation.
Mental	Player performance under pressure ²⁹	Coach's evaluation of a players attentional control and ability to perform in high pressure game moments.

ities (globally or in a specific skillset), and to enhance an athletes' self-assessments of their performance. Although experts' intuition may capture something that other metrics can't effectively identify, we must also acknowledge the challenges inherent with all subjective assessments such as human biases and potentially unfair assessments of others.¹⁷⁻¹⁹ Therefore, if one is to quantify an individual's perception, it is vital to develop and implement measures that one can trust, and which have sufficient validity-related evidence to support the intended inference practitioners are trying to make.²⁰

Interestingly, in the field of athlete recovery and health, systematic review evidence suggests that 'subjective' self-reported measurements of athlete wellbeing and recovery status may outperform 'objective' measures (e.g. physiological/ biochemical indicators).³⁰ Montull & colleagues describe that the more complex a system, the more appropriate integrative, subjective monitoring becomes.¹² While they reference and discuss athlete wellness and load response monitoring in their paper about integrative monitoring, this same logic can be extended to other complex performance-related situations in which subjective evaluation may outperform objective markers.³¹ Any sport organisation that consistently and carefully implements such subjective performance evaluations may be rewarded with a wealth of athlete, team, and practitioner-related data around complex constructs to help inform decision making (Table 2).³² In this way, subjective measures may best be viewed as an important complement to, rather than replacement for, objective metrics.³³⁻³⁵ Treating objective measures alongside subjective measures allows the practitioner to place emphasis on one, the other, or both, depending on the particular performance construct and the inference they hope to make.

A PROPOSED UNIFIED FRAMEWORK FOR UNDERSTANDING SUBJECTIVE AND OBJECTIVE DATA COLLECTION

Both subjective and objective evaluations rely on the same overarching steps to reach an inference: 1) Data generation, which together with 2) instrumentation, combines to produce a 'score', which 3) allows an inference to be made. We present this overarching framework in Figure 2, highlighting each of these steps' inherent limitations, assumptions, and potential pitfalls. Returning to our simple example of a VO₂ max test and fitness coach's assessment of player endurance, the data generating process for the VO₂ max test is the athlete riding the bike to exhaustion. If they fail to put in the maximum effort, or something else influences their ability to perform the test (e.g. they have a quad strain), the data generating process is amiss. In the subjective example, the data generating process occurs as the physical preparation coach considers the relevant factors related to the player's endurance. If they lack the adequate knowledge and context, or they are influenced by biases and focus on athlete characteristics that are unrelated to their endurance (e.g. the athlete was rude earlier that day),³⁶ or depend too heavily on outcome as compared to underlying performance,³⁷ the data generation process is compromised. Even if the data generation process is perfect, instrumentation is crucial in accurately capturing the score. The bike test can be ruined by poor bike calibration, a mask that doesn't fit properly, sensors that malfunction or an inadequate warm-up protocol. A subjective evaluation can likewise be negatively impacted by a poorly designed evaluation tool, through inappropriate item selection, delivery medium, timing, or other issue. In either case, the score produced by each test only approximates the construct in question, and the final step is the inference someone makes with the score.

We contend that the sport science literature has focused heavily on objective performance markers, both in selecting the proper 'data generating' test, and the instrumentation required to perform these tests reliably. The same however

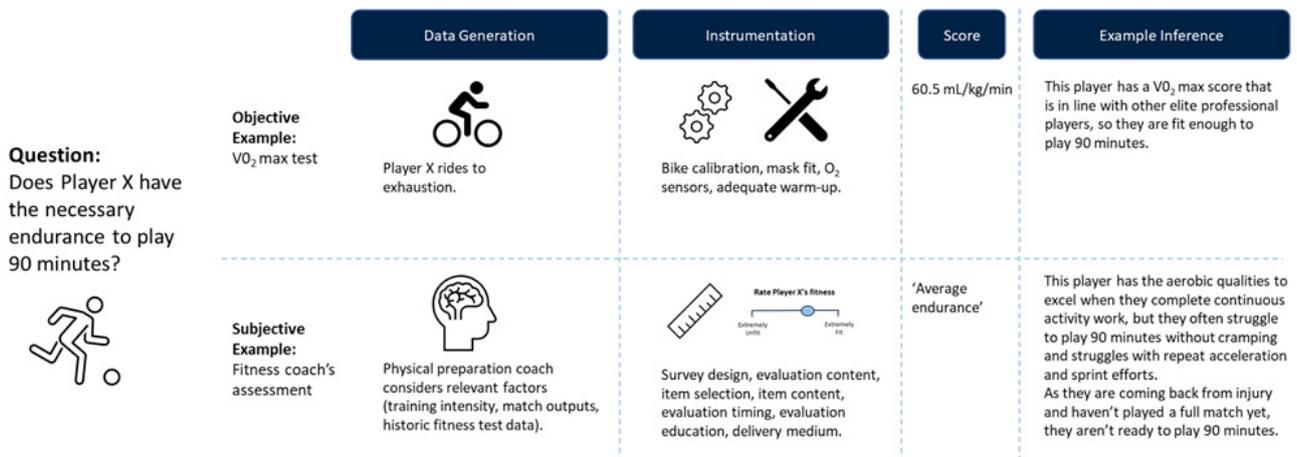


Figure 2. An overarching framework of how 'subjective' and 'objective' evaluations can be used to inform inferences.

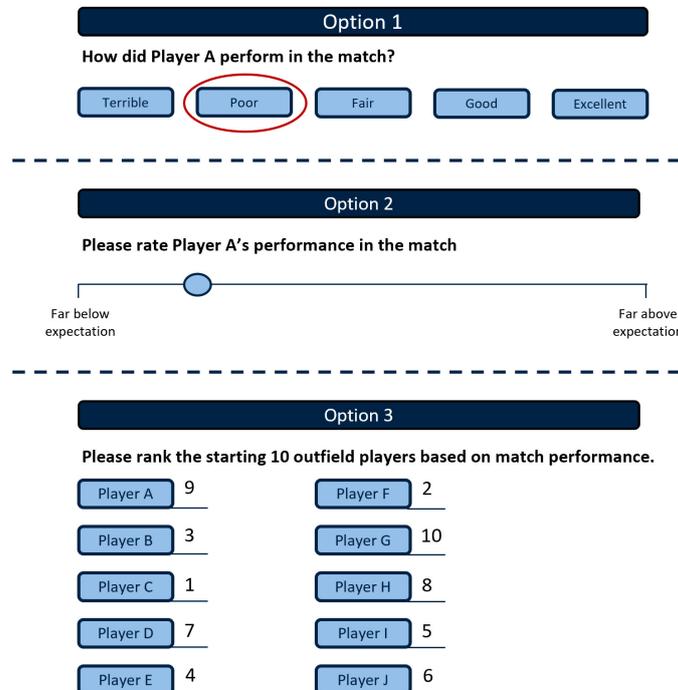


Figure 3. Three example items that can all be used to capture coaches' subjective perceptions of each player's match performances. Although not shown, options 1 & 2 would need to be completed for all players.

cannot be said about subjective performance markers. Although many inferences are made about player and team quality on the basis of subjective intuitions,¹ we know comparatively little about the data generating process for these evaluations,¹³ and even less about the instrumentation for capturing these evaluations effectively.

Implementing these evaluations is fraught with questions. Consider a simple post-match subjective evaluation that an academy football head coach and an assistant coach might independently complete after a match. One could design such an evaluation in several ways, as presented in Figure 3 where three sample subjective items are displayed.

To our knowledge, few scales with validity and reliability-related evidence are available for coaches to evaluate

player or team performances in this way. Where scales have been implemented, approaches have varied. Some have used player ranks for specific constructs like Option 3,^{10,34} others have predicted future career level,³⁸ and others have used categorical performance levels (e.g. bottom 25%, 25-50%, etc.).³⁴

In the absence of well-established existing scales, or where existing scales do not focus on the constructs of interest, organisations may have to design their own. Few resources exist in the sport science/performance literature on how a club can pragmatically develop their own subjective performance evaluations (i.e. instrumentation). For example, how should they answer questions like the following,

which arise when creating items/evaluations like those presented in [Figure 3](#):

- *What content should we include in our evaluation, is this one item sufficient or are several necessary?*
- *Should items be categorical or continuous? If categorical or ordinal, how many categories are best?*
- *What are the anchors/poles (bottom/top points) that should be used on a given item?*
- *How should we deliver the evaluation? Electronically or digitally? What are the implications of each?*
- *How can we test an evaluation that we've developed to assess its key attributes: intra-rater reliability, inter-rater reliability, internal consistency, etc.*
- *How can we reduce the biases that commonly influence the accuracy and validity of human feedback?^{18,19} In the same way that supervisors' evaluations of their employees may suffer from favouritism¹⁷ and other biases,³⁹ subjective evaluations in sport likely experience the same challenges.*

Answering each, and all, of these questions is beyond the scope of this paper, but we believe the measurement science and psychometric field can provide a pragmatic, guiding framework to develop and implement subjective evaluations in sports like it has elsewhere.⁴⁰

CALLS TO ACTION

Subjective performance evaluations are being informally implemented by virtually every sporting institution in the world, from the grassroots to the professional level. Yet, few peer-reviewed subjective scales of team or individual sport performance exist for teams to adopt, and few resources are available to help organisations develop and implement their own tools in a principled, pragmatic way. To drive this field forward and fill an important gap in the literature, collaboration between the academic and applied communities is recommended.

Therefore, to the academic community – a call exists for scales to be developed, validated, and disseminated to the applied sporting community. There is a significant gap in the sport science literature regarding the development

of subjective performance scales/surveys, their validation, and their implementation. Formal reviews detailing their use, and practical guides of measurement science and survey implementation are indicated. Where subjective evaluations are being used, there are a host of unanswered questions. What are experts' perspectives/opinions of these types of evaluations? What are the psychometric properties of these types of evaluations (e.g. intra-rater, inter-rater reliability, internal consistency)? What fundamental principles need to be used to strengthen these scales/evaluations? Using think-aloud protocols, what do experts think about when they complete these evaluations? Applying general measurement science and psychometric research principles in the realm of subjective performance evaluations in sport may bring entirely new fields of research into play, and demonstrate how human intuition can be especially valuable, or perhaps especially limited, in understanding sport performance.

To the applied sporting community – it is important to recognise that that academically produced subjective performance evaluations scales in sport may not meet the needs of each individual domain or organisation, so in-house measures may be required. In these instances, more critical reflection is required about why subjective evaluations are required, what and how subjective evaluations are implemented. In these instances – it may be highly valuable for practitioners to consider how psychometric principles may guide sporting organisations looking to develop and implement effective subjective performance evaluations.

Sport has already adopted subjective performance evaluations wholesale in practice. If the scientific and applied communities collaborate and learn from each other in a reciprocal manner, as well as from other disciplines where subjective evaluations have been more thoroughly vetted, the sport science field will benefit from increased confidence in the measures they already rely on so heavily.

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