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Position-specific fielding instances and utilisation in professional men's T20 cricket

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ABSTRACT

This descriptive study quantified the position of the first fielder involved in each delivery (primary fielding instances) in men's professional Twenty20 (T20) cricket, focusing on data from 1964 individual deliveries during the 2022/23 Australian Big Bash League. Variables considered included game phase, non-fielder events, bowling type, primary fielding instance position and all fielding positions. Primary fielding instances were classified by position, bowling type and game phase. Positional utilisation was also examined, quantifying primary fielding instances relative to how often a fielding position formed part of the fielding setup. In-fielders accounted for 63% of all primary fielding instances, with the wicket-keeper (16.4%, $n = 277$) and bowler (10.2%, $n = 172$) most involved. However, outfielders ranked in five of the top ten positions by utilisation. Notably, primary fielding instances to deep-third and fine-leg were more frequent for pace bowlers ($n = 63$) than spin-in ($n = 1$) or spin-away ($n = 0$). For spin bowlers, a higher frequency of fielding instances were observed on the side of the field that aligned with the direction of spin. The insights gained from fielder placement based on competency and specific fielding activities may enhance T20 strategies to reduce opposition runs. Further research could help assess the effectiveness of these fielder placements.

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1. Introduction

Professional cricket is played in multiple formats with different time constraints and rule variations, the most common of which are multi-day, one-day, Twenty20 (T20). The most prevalent limited-over formats of the game allow each team to bat for a single innings over a maximum of 50 (one-day) or 20 (T20) overs (ICC, 2021a, 2021b). Comparatively, multi-day cricket provides both teams with an opportunity for two batting innings, with the match constrained by both a time limit (usually 4 or 5 days) and an over limit (Farooq et al., 2021). Whilst the objective of outscoring the opposition

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team remains consistent between cricket formats, the variation in game lengths necessitates different tactical approaches for teams to be successful.

Since being introduced in 2003 (Kitchin, 2008) a short format of limited overs cricket known as T20 has proven to be commercially appealing (Rumford, 2011) and has played a pivotal role in increasing the international popularity of the sport (Krishnamohan, 2023; Rana & Bagchi, 2020; Ray, 2022). By virtue of the truncated nature of T20 cricket, batters are required to maintain higher rates of scoring to maximise their teams competitive advantage. However, converse to this and of conceivably equal importance is the ability of the fielding team to minimise the runs scored by their opponents. In multi-day cricket, tactical approaches typically differ with a greater focus on wicket-taking, leading to fielding configurations that are more offensive in nature. Thus, it is plausible that fielding with a more defensive focus that prevents opposition run-scoring may have a more notable contribution to T20 match outcomes.

Fielding in cricket primarily involves the actions of stopping, throwing and catching the ball, as well as explosive movements such as diving and sprinting up to 30 metres at a time (MacDonald Wells et al., 2018). With eleven players fielding at once and multiple factors to consider, it is conceivable that an analysis of fielding performance in T20 cricket would provide some insights into this complex environment. While previous performance analysis research in T20 cricket has examined performance indicators related to batting and bowling (Bhardwaj & Dwyer, 2022; Douglas & Tam, 2010; Irvine & Kennedy, 2017; Moore et al., 2012; Najdan et al., 2014; Petersen et al., 2008) or applied machine learning techniques to predict match outcomes (Basit et al., 2020; Dubey et al., 2020; Ishi & Patil, 2021; Kapadia et al., 2020; Priya et al., 2022; Shakil et al., 2020; Sinha, 2020; Tripathi et al., 2020) there is no known notational analysis literature pertaining to fielding in T20 cricket, despite its relative importance in this format of the game. While there is an existing body of literature involving time-motion analysis (Petersen et al., 2009; Petersen et al., 2010; Sholto-Douglas et al., 2020) which provides some interesting insights into the physical demands of T20 cricket, these findings do not describe movements and actions at a fielding position-specific level nor provide an insight into tactical performance. Thus, a notational analysis of fielding in T20 cricket at a position-specific level could contribute to tactical decision-making for an important aspect of the game.

Notational analysis has previously revealed some interesting results pertaining to fielding activity at a fielding position-specific level in multi-day (Shilbury, 1990) and one-day (MacDonald Wells et al., 2018) cricket. For example, fielding instances executed by the bowler were found to be almost double in one-day cricket (12.1%) compared to multi-day cricket (6.89%) (MacDonald Wells et al., 2018; Shilbury, 1990). However, these results are unlikely to be directly applicable to T20 cricket performance due to it being the shortest format which influences the strategies and gameplay of competing teams. Additionally, these studies do not account for other contextual factors such as the bowling type or consider the frequency that each position is utilised in a fielding configuration. For example, it can be inferred that pace bowlers delivering at medium to high speeds will influence the direction of a batted ball differently from spin bowlers, who operate at lower velocities and generate lateral deviation either away from (leg-spin) or towards (off-spin) a right-handed batter. Thus, it is conceivable that these and additional contextual factors could influence the involvement of different fielding positions. Due to the lack of position-specific fielding analysis in T20 cricket, the purpose of this study was to describe the frequency that each fielding position was involved as the first fielder (primary fielding instances) in various match contexts (i.e. between phases of the game and bowling type) in professional men's T20 cricket. The novel concept of "positional utilisation" will additionally be explored to assess the fielding activity of different fielding positions while mitigating any bias linked to fielding positions typically overrepresented within these fielding configurations. It is envisioned that these observations may inform strategies in T20 cricket by identifying over- and under-utilised fielding positions, and potentially identifying positions that may best be filled by a team's most effective fielders.

2. Materials and methods

2.1. Sample

This observational, cross-sectional study involved retrospective analysis of fielding events from a convenience sample of 10 matches from the 2022/23 Big Bash League (BBL) season, with the purpose of describing and quantifying primary fielding incidences (i.e. the first on-the-ball action of a fielder for each delivery) for different fielding positions with respect to match contexts. A Canon XA55 video camera with a wide-angle lens attachment captured footage of the sampled matches. The camera was positioned in the grandstand outside the field of play, in-line with the pitch and positioned at a height such that the whole field was in view. This set-up was used for all matches and was subsequently coded by a trained cricket performance analyst employed by a state cricket organisation. The research team was provided with the de-identified dataset which included 1964 deliveries across 19 innings (1 innings was abandoned due to rain). The dataset included fielding events from all teams who participated in the 2022/23 BBL season, however, due to video footage being captured at matches in one state, there was a bias towards the state's home teams who accounted for 66% of the sample. The project was lodged as a negligible risk ethics application with the research team's academic institution (ETH23–8377).

2.2. Coded variables of interest

Video footage of the captured matches was coded by a trained cricket video analyst using specialised software (Angles, Fulcrum Technologies Pty Ltd, Sydney, Australia). To ensure consistency between subjective measures, one analyst coded every delivery, and outfield positions were classified by sectioning the outfield into 10 distinct zones (Figure 1). Please note that this figure depicts the fielding positions relative to a right-handed batter, whereas they would be placed in mirror image for a left-handed batter while retaining the same position names. The variables of interest assessed in this study were isolated in the dataset and coded based on the definitions presented in Table 1.

For each delivery, every active fielding position was coded (i.e. the overall fielding structure), and the primary fielder was also coded (i.e. the first position to perform an on-the-ball action such as fielding the ball). Contextual information about each delivery was

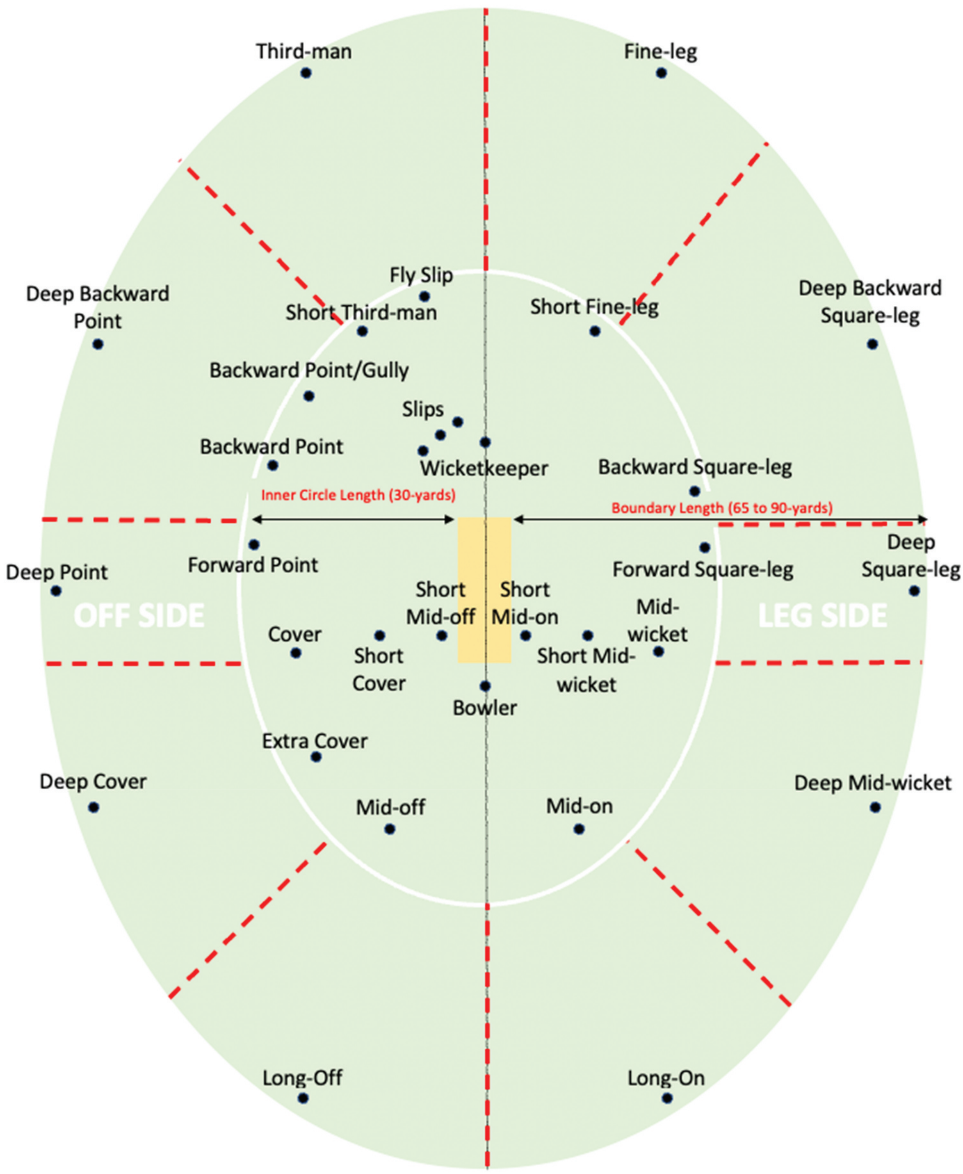

Figure 1. Fielding positions and outfield regions. These fielding positions are mirrored depending on the handedness of the batter. The field depicted in Figure 1 is for a right-handed batter.

coded with respect to the type of delivery (see Table 1 for definition), and the phase of the game (power-play/surge vs regulation play).

2.3. Statistical analysis

To assess the reliability of the dataset, the trained performance analyst coded a sub-set of the data a second time. Following the initial coding procedure, the performance analyst waited a period of two months to code a randomly selected over from each innings. This

Table 1. List of coded variables and working definitions.

Variable	Definition
Game details	A unique code for each game and identification number for each team.
Delivery	The over and ball number within each innings.
Non-fielder event	A delivery that does not involve any fielder interaction. This includes bowled and LBW dismissals or uncontested boundaries.
Phase of game	The phase of the game during which the delivery was bowled, defined as: (a) Powerplay/surge: phase of play where a maximum of two fielders are permitted to stand outside the 30-yard circle at ball release. The "surge" is unique to the BBL and is enforced at the discretion of the batting team after a minimum of 10 overs; or (b) Regulation play: phase of play where a maximum of five fielders are permitted to stand outside the 30-yard circle at ball release.
Bowling type	The bowling style relative to the batter handedness, defined as: (a) Pace: a bowler who primarily relies on speed, swing, seam movement and length variation to dismiss batters. (b) Spin-in: a bowler to whom the wicketkeeper typically stands at the stumps, and typically spins the ball towards the batter (e.g. right-arm off-spin to right-handed batter or left-arm leg-spin to right-handed batter) at a slower velocity than pace bowlers; or (c) Spin-away: a bowler to whom the wicketkeeper typically stands at the stumps, and typically spins the ball away from the batter (e.g. left-arm off-spin to right-handed batter or right-arm leg-spin to right-handed batter) at a slower velocity than pace bowlers.
Fielding positions	The fielding positions that are associated with each fielding structure for each individual delivery. This is recorded for each fielding player (11 in total) including the wicketkeeper and bowler.
Primary fielding position	The position of the fielder who makes first contact with the ball after it has been struck or missed by the batsmen, or, has a reasonable chance of fielding the ball but misses it.

resulted in 115 individual deliveries being recoded and cross-checked for a reliability analysis. Intra-rater reliability was determined for specific variables of interest (bowling type, all fielding positions, and primary fielder position for each delivery) using Krippendorff's alpha in the "irr" package (Gamer, Lemon, Fellows & Singh., 2019) in R (R Core Team, 2021). Whilst there is no universally accepted criteria for the Krippendorff's alpha reliability coefficient, Krippendorff (2004) recommended considering variables with an alpha value ≥ 0.800 as highly reliable and drawing tentative conclusions for variables falling within the range of 0.667 to 0.800.

Data were aggregated and summarised using Microsoft Excel spreadsheets (v2310, Microsoft Corporation, Washington, U.S.A.), and visualised using Tableau (v2023.1.0, Tableau Software LLC, Washington, U.S.A.). Data was categorised and summarised with respect to the bowling type and phase of game (Table 2). To quantify the involvement of each fielding position, primary fielding absolute % was calculated as a percentage of all primary fielding instances for each position across all deliveries (Equation 1).

$$Primary\,fielding\,absolute\% = \frac{Number\,of\,primary\,fielding\,instances\,forfielder}{\begin{array}{c}Total\,number\,of\,sampled\,deliveries\\(excluding'nonfielder'events)\end{array}} \times 100 \quad (1)$$

Table 2. Primary fielding instances by bowling type.

	All Fielding Instances	Fielding Instances in Powerplay & Surge	Fielding Instances in Regulation Play
Pace bowling	1101 (65.0%)	396 (78.1%)	705 (59.4%)
Spin-away bowling	369 (21.8%)	68 (13.4%)	301 (25.4%)
Spin-in bowling	224 (13.2%)	43 (8.5%)	181 (15.2%)
Total	1694 (100%)	507 (100%)	1187 (100%)

To describe positional utilisation, a primary fielding relative % metric was also calculated (Equation 2). This was calculated as a percentage of the deliveries in which a fielding position formed part of a fielding configuration.

$$\textit{Primary fielding relative\%} = \frac{\textit{Number of primary fielding instances forfielder}}{\begin{array}{c}\textit{Number of deliveries where the}\\ \textit{fielding position was installed}\\ (\textit{excluding}'\textit{nonfielder}'\textit{events})\end{array}} \times 100 \quad (2)$$

3. Results

Reliability of coding for bowling type (α = 1.000) and primary fielding position (α = 0.989) were above the α ≥ 0.800 suggestion from Krippendorff (2004), indicating that the variables coded could be considered "highly reliable". All individual fielding positions except for five were determined at α ≥ 0.800. Deep point, deep backward square-leg, and deep backward point were α = 0.729–0.776, while backward point/gully and forward square-leg were α = 0.394 and α = 0, respectively. However, the values produced by backward point/gully and forward square-leg may be attributed to kappa's paradox for these samples where the position was only coded once in the first but not second coding attempts. These low reliability values may also be attributed to the subtle locational differences between individual fielding positions, especially for in-fielders positioned within the 30-yard circle (Figure 1).

From 1964 deliveries captured in this dataset, 1694 primary fielding instances were recorded (86.3% of the total dataset) as depicted in Table 2. The remaining deliveries (n = 270) were marked as a non-fielder event (13.8% of the total dataset). In total, 30 different fielding positions were identified within a fielding configuration and 27 of these were associated with a primary fielding instance (Table 3). The powerplay/surge period accounted for 30.0% of the sample where a primary fielding instance was recorded, while deliveries in regulation play accounted for 70.0% of the sample where a primary fielding instance was recorded. The distribution of primary fielding instances according to game phase and bowling type is summarised in Table 2.

The fielding positions that demonstrated the highest primary fielding instance frequency when accounting for all bowling types across both phases of the game were the wicketkeeper, bowler, backward point, deep backward square-leg, deep point, deep mid-wicket, and cover, respectively, with these seven positions accounting for 60.2% of all primary fielding instances (Table 3). All other positions were each involved in less than 6% of all primary fielding instances, with three positions (3rd slip, fly slip and forward square-leg) not performing any primary fielding instances within the matches sampled.

When expressed as a percentage of the frequency that each position formed part of fielding configuration (i.e. primary fielding relative %), the wicketkeeper was utilised the most often as the primary fielder (Table 4). This was followed by short cover, short mid-wicket, mid-wicket and deep mid-wicket, respectively. Figure 2 illustrates the difference between the primary fielding absolute % and primary fielding relative % for all bowling styles and phases of the game.

Accounting for all game phases, the primary fielding instances were performed mainly by in-fielders (63.3% (n = 1073); outfielders: 36.6% (n = 621)). In the

Table 3. Primary fielding instances by fielding position, bowling type and phase of the game.

	All Bowling Types			Pace Bowling			Spin-away Bowling			Spin-In Bowling		
Fielding Positions	ALL	PPS	REG	ALL	PPS	REG	ALL	PPS	REG	ALL	PPS	REG
Wicketkeeper	**277 (16.4%)**	97	180	203 (18.4%)	85	118	46 (12.5%)	5	41	28 (12.5%)	7	21
Bowler	**172 (10.2%)**	52	120	106 (9.6%)	42	64	42 (11.4%)	6	36	24 (10.7%)	4	20
Backward Point	**127 (7.5%)**	42	85	96 (8.7%)	36	60	22 (6.0%)	4	18	9 (4.0%)	2	7
Deep Backward Square-leg*	**125 (7.4%)**	35	90	86 (7.8%)	34	52	18 (4.9%)	0	18	21 (9.4%)	1	20
Deep Point*	**111 (6.6%)**	11	100	67 (6.1%)	11	56	33 (8.9%)	0	33	11 (4.9%)	0	11
Deep Mid-wicket*	**105 (6.2%)**	14	91	53 (4.8%)	8	45	28 (7.6%)	5	23	24 (10.7%)	1	23
Cover	**103 (6.1%)**	36	67	62 (5.6%)	24	38	33 (8.9%)	9	24	8 (3.6%)	3	5
Mid-wicket	**97 (5.7%)**	32	65	65 (5.9%)	24	41	8 (2.2%)	3	5	24 (10.7%)	5	19
Long-on*	**94 (5.5%)**	8	86	43 (3.9%)	0	43	29 (7.9%)	2	27	22 (9.8%)	6	16
Long-off*	**59 (3.5%)**	5	54	24 (2.2%)	1	23	33 (8.9%)	4	29	2 (0.9%)	0	2
Mid-off	**58 (3.4%)**	29	29	54 (4.9%)	25	29	2 (0.5%)	2	0	2 (0.9%)	2	0
Mid-On	**56 (3.3%)**	41	15	54 (4.9%)	40	14	2 (0.5%)	1	1	0 (0%)	0	0
Short Fine-leg	**49 (2.9%)**	18	31	22 (2.0%)	12	10	16 (4.3%)	4	12	11 (4.9%)	2	9
Deep-Third *	**37 (2.2%)**	7	30	37 (3.4%)	7	30	0 (0%)	0	0	0 (0%)	0	0
Short Third	**36 (2.1%)**	11	25	16 (1.5%)	8	8	9 (2.4%)	2	7	11 (4.9%)	1	10
Deep Square-leg*	**34 (2.0%)**	16	18	28 (2.5%)	10	18	2 (0.5%)	2	0	4 (1.8%)	4	0
Extra Cover	**34 (2.0%)**	7	27	19 (1.7%)	6	13	12 (3.3%)	1	11	3 (1.3%)	0	3
Forward Point	**30 (1.8%)**	28	2	16 (1.5%)	14	2	11 (3.0%)	11	0	3 (1.3%)	3	0
Fine-leg*	**27 (1.6%)**	3	24	26 (2.4%)	3	23	0 (0%)	0	0	1 (0.4%)	0	1
Deep Backward Point*	**20 (1.2%)**	0	20	6 (0.5%)	0	6	1 (0.3%)	0	1	13 (5.8%)	0	13
Backward Point/Gully	**18 (1.1%)**	2	16	9 (0.8%)	2	7	8 (2.2%)	0	8	1 (0.4%)	0	1
Deep Cover*	**9 (0.5%)**	0	9	3 (0.3%)	0	3	6 (1.6%)	0	6	0 (0%)	0	0
1st Slip	**5 (0.3%)**	3	2	3 (0.3%)	2	1	1 (0.3%)	0	1	1 (0.4%)	1	0
Backward Square-leg	**5 (0.3%)**	4	1	2 (0.2%)	1	1	3 (0.8%)	3	0	0 (0%)	0	0
Short Cover	**4 (0.2%)**	4	0	0 (0%)	0	0	4 (1.1%)	4	0	0 (0%)	0	0
2nd Slip	**1 (0.1%)**	1	0	1 (0.1%)	1	0	0 (0%)	0	0	0 (0%)	0	0
Short Mid-wicket	**1 (0.1%)**	1	0	0 (0%)	0	0	0 (0%)	0	0	1 (0.4%)	1	0
3rd Slip	**0 (0%)**	0	0	0 (0%)	0	0	0 (0%)	0	0	0 (0%)	0	0
Fly Slip	**0 (0%)**	0	0	0 (0%)	0	0	0 (0%)	0	0	0 (0%)	0	0
Forward Square-leg	**0 (0%)**	0	0	0 (0%)	0	0	0 (0%)	0	0	0 (0%)	0	0
Totals	**1694**	**507**	**1187**	**1101**	**396**	**705**	**369**	**68**	**301**	**224**	**43**	**181**

PPS = powerplay/surge, REG = regulation play, *outfield position, spin types classified on assumed "stock" delivery.

powerplay/surge, in-fielders performed 80.5% ($n = 408$) of the primary fielding instances while outfielders performed 19.5% ($n = 99$). During regulation play, in-fielders performed 56.0% ($n = 665$) of the primary fielding instances while out-fielders performed 44.0% ($n = 522$). When assessing the primary fielding instances with respect to the location of the fielding positions stationed on the off-side or leg-side (excluding the wicketkeeper and bowler), the off-side/leg-side ratio was 52:48 (off-side $n = 652$, leg-side $n = 593$) accounting for all bowling types and phases of the game. The off-side/leg-side ratio was 47:53 (off-side $n = 370$, leg-

Table 4. Primary fielding relative percentage (positional utilisation) by fielding position, bowling type and phase of the game.

	All Bowling Types			Pace Bowling			Spin-away Bowling			Spin-in Bowling		
Fielding Positions	ALL	PPS	REG	ALL	PPS	REG	ALL	PPS	REG	ALL	PPS	REG
Wicketkeeper	**16.4%**	19.1%	15.2%	18.4%	21.5%	16.7%	12.5%	7.4%	13.6%	12.5%	16.3%	11.6%
Short Cover	**13.3%**	23.5%	0.0%	0.0%	0.0%	0.0%	28.6%	44.4%	0.0%	0.0%	0.0%	0.0%
Short Mid-wicket	**12.5%**	33.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	100.0%	0.0%
Mid-wicket	**12.3%**	11.7%	12.6%	11.1%	11.5%	10.9%	10.0%	9.4%	10.4%	19.4%	15.2%	20.9%
Deep Mid-wicket*	**11.7%**	10.0%	12.0%	12.7%	7.5%	14.5%	9.2%	19.2%	8.2%	13.4%	12.5%	13.5%
Deep Point*	**11.3%**	14.3%	11.5%	10.9%	14.3%	10.4%	14.0%	0.0%	14.0%	11.0%	0.0%	11.0%
Deep Cover*	**11.0%**	0.0%	11.0%	9.1%	0.0%	9.1%	14.6%	0.0%	14.6%	0.0%	0.0%	0.0%
Deep Backward Square-leg*	**10.3%**	12.1%	9.8%	12.1%	13.4%	11.4%	5.9%	0.0%	6.2%	10.7%	5.3%	11.3%
Bowler	**10.2%**	10.3%	10.1%	9.6%	10.6%	9.1%	11.4%	8.8%	12.0%	10.7%	9.3%	11.0%
Backward Point	**9.3%**	9.7%	9.2%	10.4%	10.7%	10.1%	7.0%	6.3%	7.1%	7.6%	5.7%	8.4%
Long-on*	**9.1%**	12.3%	8.9%	8.4%	0.0%	8.7%	9.6%	16.7%	9.3%	10.1%	13.5%	8.9%
Cover	**8.9%**	10.3%	8.4%	8.7%	9.2%	8.5%	12.2%	16.4%	11.1%	4.7%	8.8%	3.7%
Mid-on	**8.5%**	9.3%	6.7%	9.2%	10.6%	6.6%	3.0%	1.8%	9.1%	0.0%	0.0%	0.0%
Forward Point	**8.2%**	8.2%	7.1%	5.8%	5.5%	9.5%	17.7%	18.0%	0.0%	9.7%	12.0%	0.0%
Deep Square-leg*	**7.7%**	9.8%	6.5%	7.9%	9.3%	7.3%	3.6%	5.9%	0.0%	12.5%	18.2%	0.0%
Backward Square-leg	**7.7%**	8.9%	5.0%	6.3%	8.3%	5.0%	11.5%	11.5%	0.0%	0.0%	0.0%	0.0%
Long-off*	**7.6%**	9.6%	7.4%	9.4%	20.0%	9.2%	9.5%	8.5%	9.7%	1.1%	0.0%	1.1%
Deep Backward Point*	**7.5%**	0.0%	8.4%	3.6%	0.0%	4.3%	4.0%	0.0%	4.0%	17.8%	0.0%	17.8%
Extra Cover	**6.9%**	5.5%	7.4%	5.4%	5.5%	5.3%	14.0%	10.0%	14.5%	5.8%	0.0%	6.7%
Mid-off	**6.6%**	6.8%	6.4%	6.7%	6.9%	6.5%	9.1%	9.5%	0.0%	4.2%	4.7%	0.0%
Deep-Third *	**6.5%**	5.0%	7.0%	6.5%	5.0%	7.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fine-leg*	**5.4%**	5.0%	5.4%	5.2%	5.0%	5.3%	0.0%	0.0%	0.0%	50.0%	0.0%	50.0%
Backward Point/ Gully	**4.6%**	1.4%	6.5%	5.7%	2.6%	8.6%	4.8%	0.0%	6.5%	1.5%	0.0%	2.3%
Short Fine-leg	**4.4%**	4.3%	4.4%	4.1%	3.9%	4.2%	4.4%	5.9%	4.1%	5.2%	4.7%	5.3%
Short Third	**4.0%**	3.6%	4.1%	3.1%	3.1%	3.0%	4.2%	8.3%	3.7%	6.4%	4.3%	6.7%
2nd Slip	**2.9%**	3.7%	0.0%	2.9%	3.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1st Slip	**2.2%**	1.6%	5.0%	1.6%	1.3%	3.1%	7.7%	0.0%	14.3%	5.3%	5.6%	0.0%
3rd Slip	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fly Slip	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Forward Square-leg	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

PPS = powerplay/surge, REG = regulation play, *outfield position, spin types classified on assumed "stock" delivery.

side $n = 423$) for pace bowling, 62:38 (off-side $n = 175$, leg-side $n = 106$) for spin-away and 37:63 (off-side $n = 64$, leg-side $n = 107$) for spin-in.

4. Discussion

This study quantified the activity of different fielding positions during professional men's T20 cricket while accounting for selected contextual factors, and provided a contemporary description of fielding practices in T20 cricket. The results of the current study demonstrated some similarities as well as some notable differences in fielding practices when compared to multi-day (Shilbury, 1990) and one-day (MacDonald Wells et al., 2018) cricket. Further, some novel results were also presented, when accounting for the effect of these contextual factors and utilisation of each fielding position relative to the number of times that they formed part of a fielding configuration.

Across both phases of the game and accounting for all bowling types, the wicketkeeper demonstrated the highest number of primary fielding instances ($n = 277$), consistent with

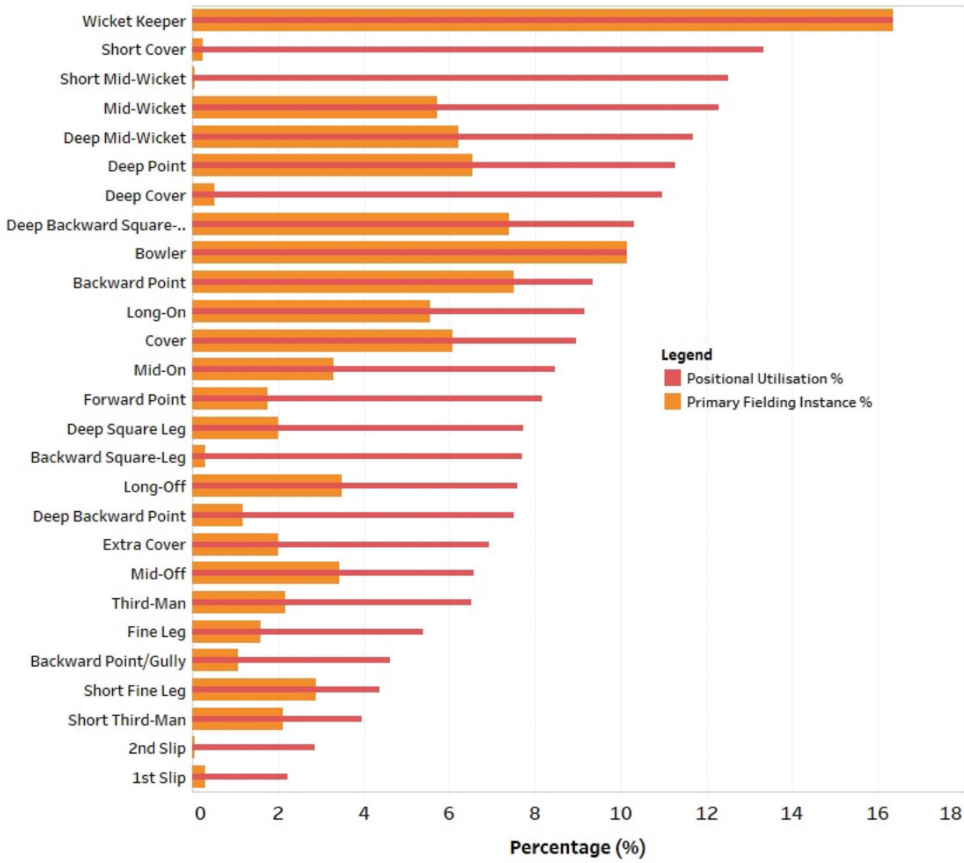

Figure 2. Primary fielding instances expressed as a percentage of all deliveries (absolute) and relative to deliveries in which the position was implemented (relative). This figure excludes fielding positions (3rd slip, fly slip and forward square-leg) that demonstrated no primary fielding instances.

previous reports in multi-day (Shilbury, 1990) and one-day (MacDonald Wells et al., 2018) matches. However, the primary fielding absolute % of the wicketkeeper (16.4%) is lower than previous studies (20.9%, Shilbury, 1990; 32.4%; MacDonald Wells et al., 2018), suggesting that batters in T20 cricket may have a higher propensity to hit the ball or not let it pass through to the wicketkeeper compared to other match formats. The bowler performed the second most primary fielding instances ($n = 172$, 10.2%), consistent with the results from one-day matches (12.1%, MacDonald Wells et al., 2018). Shilbury (1990) notably reported a lower percentage of primary fielding instances by bowlers in multi-day cricket (6.9%), suggesting either a greater tendency for deliveries to be played back towards the bowler or an increase in motivation for bowlers to attempt fielding efforts from their own bowling during limited-overs formats due to the greater perceived importance of saving runs from every ball. However, as the data reported by Shilbury (1990) was from a non-elite sample and collected over 30 years ago, it is unclear whether this is true in contemporary multi-day cricket. The prevalence of the wicketkeeper and bowler as notable fielders can be somewhat attributed to their inclusion in every fielding configuration i.e. they are a potential fielder for every delivery. For instance, the bowler was ranked as the 9th most utilised fielder (Table 4) when accounting for this bias by using the primary fielding relative %, indicating that there were several other fielding positions with higher levels of fielding activity when accounting for whether or not the position was included within a fielding configuration. Furthermore, cover ($n = 103$, 6.1%) observed a lower primary fielding absolute % relative to multi-day (11.65%, Shilbury, 1990) and one-day (12.1%, MacDonald Wells et al., 2018) cricket, and was utilised as the primary fielder for 8.9% of the deliveries in which they were part of a fielding configuration (ranked 12th). This could be ascribed to differences in the dynamic interaction between batters and bowlers across formats. For example, in longer-formats of the game, bowlers are more inclined to bowl a consistent line and length that is conducive to lower-risk cricket shots played towards the regions of mid-off, mid-on and cover (Figure 1) as described by Stretch et al. (2000). Conversely, in T20, successful teams tend to bowl with a greater variation in length (Najdan et al., 2014) and batters are more inclined to play higher-risk cricket shots that are played across the line of the ball (Stretch et al., 2000) such as a "slog" or "reverse sweep", in an attempt to score across all regions of the field. Therefore, proficient inner-circle fielders may be more effective in contributing to the run-saving capabilities of the fielding team by being positioned in fielding locations other than those previously regarded as important in other match formats.

When examining the number of deliveries between game phases, key observations regarding the importance of in-field and outfield positions become apparent. Our results indicated that primary fielding instances for in-fielders accounted for 63% of all instances, which was notably higher than findings in one-day cricket (51%, MacDonald Wells et al., 2018). This can be attributed to a greater proportion of overs bowled with fielding restrictions that limit the number of outfielders to a maximum of two in T20 cricket (6 overs, 30% of innings) relative to one-day cricket (10 overs, 20% of innings). However, outfielders should be seen as relatively more crucial to a team's overall fielding efforts as they occupy 5 out of the top 10 fielding positions according to positional utilisation (Table 4; when omitting short cover and short midwicket due to low sampling; i.e. they formed part of fielding configuration $n = 30$ and $n = 8$ times respectively), despite the observation that 20 out of a possible 30 different fielding positions were classified as in-fielders. As winning teams have been reported to score a higher number of total runs from boundaries (Bhardwaj & Dwyer, 2022; Douglas & Tam, 2010; Irvine & Kennedy, 2017; Moore et al., 2012; C. Petersen et al., 2008), it seems logical for teams to position the maximum number of outfielders in each phase of the game (powerplay/surge = 2, regulation play = 5) as their broader spatial coverage enhances the likelihood of intercepting the ball before it reaches the boundary (MacDonald Wells et al., 2018).

Distinct differences in fielding activity were observed when comparing the primary fielding instances for different bowling types. For example, primary fielding instances to deep-third and fine-leg combined were greater for pace bowlers ($n = 63$) compared to both spin-in ($n = 1$) and spin-away ($n = 0$). This may be attributed to the additional velocity of the ball generated by pace bowlers which enables batters to accumulate runs behind the wicket (i.e. the region directly behind the batter's stumps) more easily (Jamil et al., 2022; Renshaw & Holder, 2010). For spin bowlers, it was observed that fielding positions aligning with the direction of spin tended to accrue a higher frequency of primary fielding instances relative to fielding positions located on the opposite side of the playing area. When excluding the bowler and wicketkeeper, the off-side/leg-side primary fielding instances ratio across all phases of the game was 62:38 for spin-away and 37:63 for spin-into the batter. From these findings it is reasonable to infer that fielding positions situated in the direction of spin are more active, suggestive of the propensity for batsmen to favour shots aligned with the trajectory of the spin. Therefore, it is advisable for teams to consider how bowling speeds and the spin direction affects their fielding configuration and the placement of their most skilled fielders. However, the effectiveness of the fielding placements is also reliant on the accuracy and consistency of the bowler.

The novel calculation of primary fielding relative % (Equation 2) reduces the biases associated with simple fielding instance counts by considering the number of times that a fielding position formed part of a fielding configuration, as certain fielding positions may form part of a standard fielding configuration more often than others. For example, while the bowler observed the second highest number of primary fielding instances (n = 172, 10.2%), this may be attributed to the notion that bowlers form part of every fielding configuration and is evident in their lower ranking according to positional utilisation (9^{th}), as previously discussed. Figure 2 illustrates comparisons between primary fielding instances (primary fielding absolute %) and positional utilisation (primary fielding relative %) to display the differences between the two metrics. It may be more advantageous for teams to arrange more competent fielders into the fielding positions with the highest primary fielding relative %, such as mid-wicket (12.3%), deep mid-wicket (11.7%) and deep point (11.3%) (Figure 1). By arranging more competent fielders into the fielding positions that demonstrate higher fielding activity when they form part of a fielding configuration, it's expected that this will lead to more successful fielding efforts, resulting in more runs saved or dismissal opportunities created. However, the infrequent utilisation of certain fielding positions (i.e. short cover and short mid-wicket) should be considered as it limits the applicability of these results. Further, specific shot tendencies associated with each batter are intrinsically linked to fielding configurations and thus, could conceivably influence the frequency of fielder involvement. To improve the understanding of the effectiveness of fielding positions in T20 cricket, it is recommended that future research consider a model that factors in favoured batter shots.

The current study has provided a valuable insight into the fielding practices in professional men's T20 cricket, however the results should be interpreted within the limitations of the study. Whilst the reliability of coding was acceptable with the exception of five fielding positions that were below the $\alpha \geq 0.800$ recommendation from Krippendorff (2004), the subjective nature of coded fielding positions and primary fielding instances should be considered when interpreting and applying the results of this study. Additionally, inter-rater reliability was not assessed, and the potential for variations in the dataset produced by different video analysts should be considered when interpreting the results. The present study is likewise limited by the dataset that categorised all "pace" bowlers together regardless of their actual bowling speed, and did not account for spin-bowling variations that may spin in the opposite direction to a bowlers assumed "stock" delivery. Further, the data was sampled from men's matches with an overrepresentation of the home teams within a particular state of Australia. Thus, these results may not be applicable to all professional T20 teams, especially women's teams.

Further research involving a larger, balanced sample would be warranted to confirm the results of the current study in a wider population.

In conclusion, a number of differences and similarities for key fielding positions (the wicketkeeper, bowler and cover) were observed in this study when drawing comparisons to different match formats. Outfielders demonstrated a higher percentage of fielding activity than in-fielders according to positional utilisation. Key differences were explored between bowling types, with fielding positions aligned with the direction of spin for spin bowlers found to accrue a higher frequency of primary fielding instances which may be indicative of batting tendencies. Finally, the novel concept of positional utilisation was presented to reduce the biases associated with the assessment of primary fielding instances.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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