IAAF World Championships
LONDON 2017

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Championships
LONDON 2017

BIOMECHANICAL REPORT

FOR THE

IAAF *World Championships*
LONDON 2017

Javelin Throw Women's

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INTRODUCTION

The women's javelin final took place on the evening of August 8th. Coming into the final, Sara Kolak of Croatia was a favourite for the gold medal following a strong season, in which she produced both a personal best and world leading distance of 68.43 m. However, in the second it was Barbora Špotáková, a double Olympic gold medallist and current world record holder from the Czech Republic, who delivered the gold medal throw with a distance of 66.76 m. In the third round Lingwei Li from China provided the main challenge to Špotáková with a throw of 66.25 m (a personal best) for the silver medal. Huihui Lyu produced a best throw of 65.26 m in the fifth round, which was sufficient to secure the bronze medal.

IAAF World Championships — London 4-13 August 2017

RESULTS

Javelin Throw Women - Final

RECORDS		RESULT	NAME	COUNTRY	AGE	VENUE	DATE
World Record	WR	72.28	Barbora ŠPOTÁKOVÁ	CZE	27	Stuttgart (Gottlieb-Daimler Stadion)	13 Sep 2008
Championships Record	CR	71.99	Maria ABAKUMOVA	RUS	25	Daegu (DS)	2 Sep 2011
World Leading	WL	68.43	Sara KOLAK	CRO	22	Lausanne (Pontaise)	6 Jul 2017
Area Record	AR		National Record NR			Personal Best PB	Season Best SB

8 August 2017 — 19:20 START TIME — 20:31 END TIME — TEMPERATURE 16° C / 16° C — HUMIDITY 77 % / 77 %

PLACE	NAME	COUNTRY	DATE of BIRTH	ORDER	RESULT		1	2	3	ORDER	4	5	6
1	Barbora ŠPOTÁKOVÁ	CZE	30 Jun 81	6	66.76		58.48	66.76	X	8	65.64	62.57	63.75
2	Lingwei LI	CHN	26 Jan 89	8	66.25	PB	61.81	63.01	66.25	7	65.38	X	64.88
3	Huihui LYU	CHN	26 Jun 89	1	65.26		62.71	62.44	61.95	2	60.87	65.26	58.30
4	Sara KOLAK	CRO	22 Jun 95	4	64.95		X	64.95	X	6	57.38	63.50	X
5	Eda TUGSUZ	TUR	27 Mar 97	10	64.52		61.81	64.52	X	5	63.68	64.47	62.77
6	Tatsiana KHALADOVICH	BLR	21 Jun 91	3	64.05		63.04	64.05	X	4	X	62.62	X
7	Katharina MOLITOR	GER	8 Nov 83	12	63.75		59.81	63.75	58.99	3	59.67	59.80	58.87
8	Shiying LIU	CHN	24 Sep 93	11	62.84		X	X	62.28	1	62.84	61.31	61.39
9	Martina RATEJ	SLO	2 Nov 81	2	61.05		61.05	X	59.11				
10	Kelsey-Lee ROBERTS	AUS	20 Sep 91	5	60.76		60.76	58.39	59.76				
11	Ásdís HJÁLMSDÓTTIR	ISL	28 Oct 85	9	60.16		57.38	60.16	X				
12	Elizabeth GLEADLE	CAN	5 Dec 88	7	60.12		60.12	58.87	58.36				

Timing and Measurement by SEIKO — AT-JT-W-f--A--.RS1..v1 — Issued at 20:32 on Tuesday, 08 August 2017

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METHODS

Three camera positions were secured at vantage locations around the stadium (Figure 1). A total of three high-speed cameras were used to record the action during the javelin final. Three Sony PXW-FS7 cameras operating at 150 Hz (shutter speed: 1/1250; ISO: 2000-4000 depending on the light; FHD: 1920x1080 px) were positioned at the three locations to provide three-dimensional (3D) footage for the analysis of all key phases of the javelin throw.
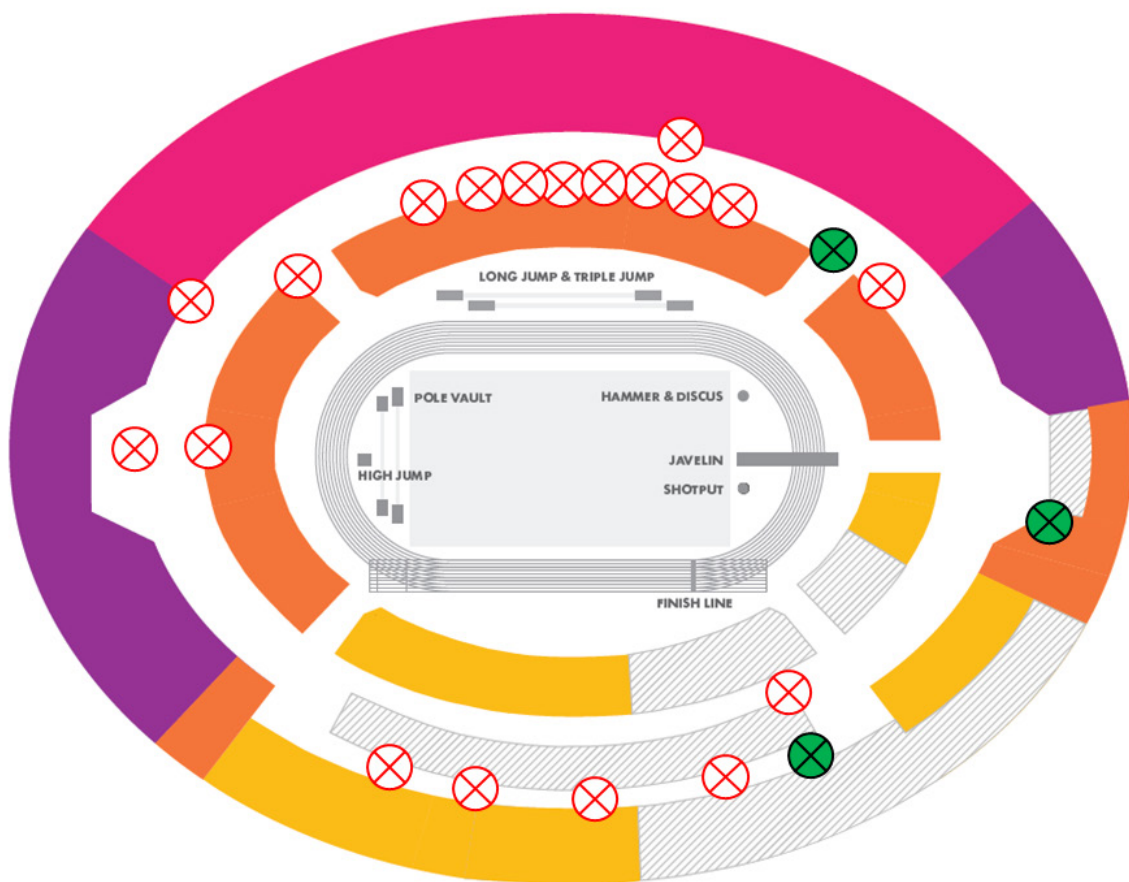
Figure 1. Stadium layout with camera locations for the women's javelin throw (shown in green).

Before and after the final competition a calibration procedure was conducted to capture the performance volume. A rigid cuboid calibration frame was positioned at multiple points on the javelin runway to ensure an accurate capture volume of the athlete's approach and release. This approach produced a large number of non-coplanar control points within the calibrated volume to facilitate the construction of a global coordinate system.

All video files were imported into SIMI Motion (SIMI Motion version 9.2.2, Simi Reality Motion Systems GmbH, Germany) and manually digitised by a single experienced operator to obtain kinematic data. Each video file was synchronised at four critical instants to synchronise the two-

dimensional coordinates from each camera involved in the recording. Both the javelin and body segments were tracked 12 m before the throw line and up to 10 frames after release to provide padding during filtering. All video files were digitised frame-by-frame, and upon completion, the points-over-completion was used to make any necessary adjustments. The javelin and selected body segments were tracked at each point through the full motion.

Figure 2. Javelin calibration frame during construction at the London Stadium.

The Direct Linear Transformation (DLT) algorithm was used to reconstruct the real-world 3D coordinates from individual camera's x and y image coordinates. The reliability of the manual digitising was estimated by repeated digitising of a whole throw with an intervening period of 48 hours. Results showed minimal systematic and random errors and therefore confirmed the high reliability of the digitising process. De Leva's (1996) body segment parameter models were used to obtain data for the whole body centre of mass. A recursive second-order, low-pass Butterworth digital filter (zero phase-lag) was employed to filter the raw coordinate data. The cut-off frequencies were calculated using residual analysis.
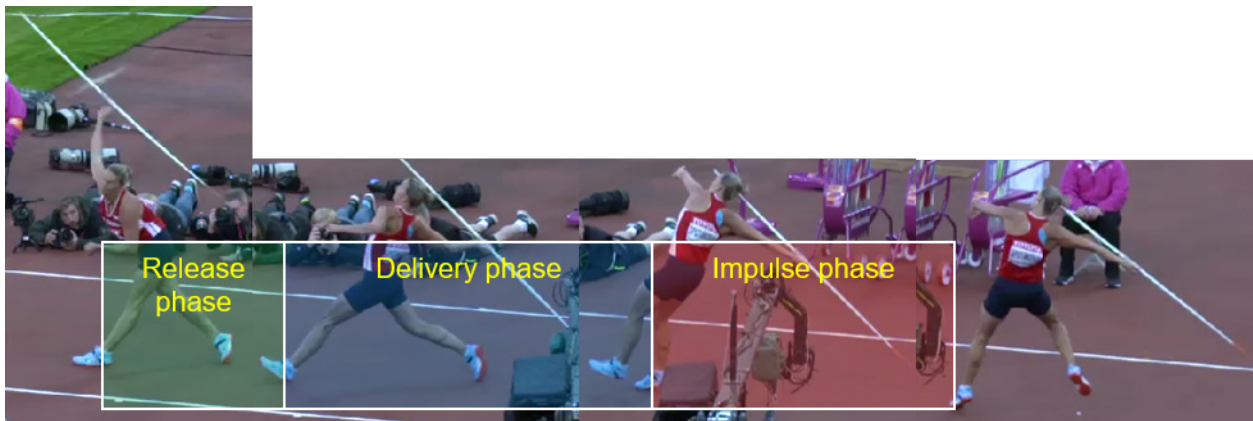
Figure 3. Visual representation of key phases leading up to release.

For the athletes (all were right-handed), the impulse phase was from penultimate left foot touchdown to the final right foot touchdown. The delivery phase was from final right foot touchdown to final left foot touchdown for all athletes. Therefore, the release phase was from final left foot touchdown to release for all athletes.

Table 1. List of variables.

Variable	Definition
Release velocity	The resultant velocity of the javelin at the point of release.
Horizontal release velocity	The horizontal (anterposterior) component of the javelin release velocity.
Vertical release velocity	The vertical component of the javelin release velocity.
Release height	The vertical distance from the javelin's grip to the ground at release.
Release angle	The angle between the javelin direction of travel and the horizontal at release.
Attitude angle	The angle between the javelin's longitudinal axis and the horizontal at release.
Angle of attack	The difference between the angle of release and the angle of attitude at release.
Sideslip angle	The angle between the direction of the velocity vector at release and the javelin's longitudinal axis (looking from behind).
Forearm angle at release	The angle between the forearm and the horizontal at release.

Upper arm angle at release	The angle between the upper arm and the horizontal at release.
Trunk angle at release	The angle between the trunk and the horizontal at release.
Horizontal CM velocity	The anteroposterior velocity of the body CM at release.
Vertical CM velocity	The vertical velocity of the body CM at release.
Absolute CM velocity	The resultant velocity of the body CM at release.
D_{imp} – Distance of impulse step	The penultimate left foot contact to final right foot contact.
D_{del} – Distance of delivery step	The final right foot contact to final left foot contact.
D_{FL} – Distance to the foul line	The horizontal distance from the plant foot to the foul line at release.
Duration of impulse phase	The time between penultimate left foot contact and final right foot contact.
Duration of delivery phase	The time between final right foot contact and final left foot contact.
Duration of release phase	The time between final left foot contact and release.
Approach velocity	The velocity of the head at the start of the impulse phase.
CM-RF	The distance between the whole-body CM and the CM of the right foot at the beginning of the delivery phase.
LF-JC	The distance between the point of left foot contact and the javelin grip at the beginning of the release phase.
TT-LTD	The angle of the trunk relative to the vertical at the beginning of the release phase. A positive angle indicates a forwards lean, whereas a negative angle indicates a backwards lean.
SKF	The angle of the supporting (left) knee joint (thigh-shank angle) at the point of release and considered to be 180° in the anatomical standing position. An angle greater than 180° indicates hyperextension at the knee joint.

Note: CM = centre of mass.

RESULTS

The following table shows the official distance of the women's javelin final in comparison to personal and season's best throws.

Table 2. Attempts analysed and official distances for each athlete.

Athlete	Attempt analysed	Official distance (m)	% Season's best	% Personal best
ŠPOTÁKOVÁ	2	66.76	−2.20	−7.64
LI	3	66.25	+3.35	+1.75
LYU	5	65.26	−3.45	−3.45
KOLAK	2	64.95	−5.09	−5.09
TUGSUZ	2	64.52	−4.00	−4.00
KHALADOVICH	2	64.05	−3.39	−3.45
MOLITOR	2	63.75	−2.48	−5.82
LIU	4	62.84	−5.46	−5.46
RATEJ	1	61.05	−6.99	−9.10
ROBERTS	1	60.76	−5.62	−5.62
HJÁLMSDÓTTIR	2	60.16	−5.16	−5.16
GLEADLE	1	60.12	−6.75	−7.27

Biomechanics of the javelin release

This section of the report presents the key javelin release parameters across all athletes. The medallists are highlighted in their respective medal colours in the figures shown.

Table 3. Javelin release parameters.

	Release velocity (m/s)	Release angle (°)	Release height (m)
ŠPOTÁKOVÁ	26.42	31.9	1.92
LI	24.91	30.8	1.85
LYU	24.17	38.2	1.83
KOLAK	25.28	30.9	1.88
TUGSUZ	24.28	38.5	1.70
KHALADOVICH	24.76	39.4	1.82
MOLITOR	23.98	36.3	2.05
LIU	22.95	38.5	1.73
RATEJ	24.09	34.4	1.95
ROBERTS	24.73	31.6	1.75
HJÁLMSDÓTTIR	23.20	31.9	1.84
GLEADLE	23.09	35.9	1.96

Figure 4 shows the respective contributions of the horizontal and vertical components of javelin release velocity, highlighting the potential trade-off between horizontal and vertical velocities. Initials indicate each athlete and medallists have been highlighted by filled circles with medal colours.
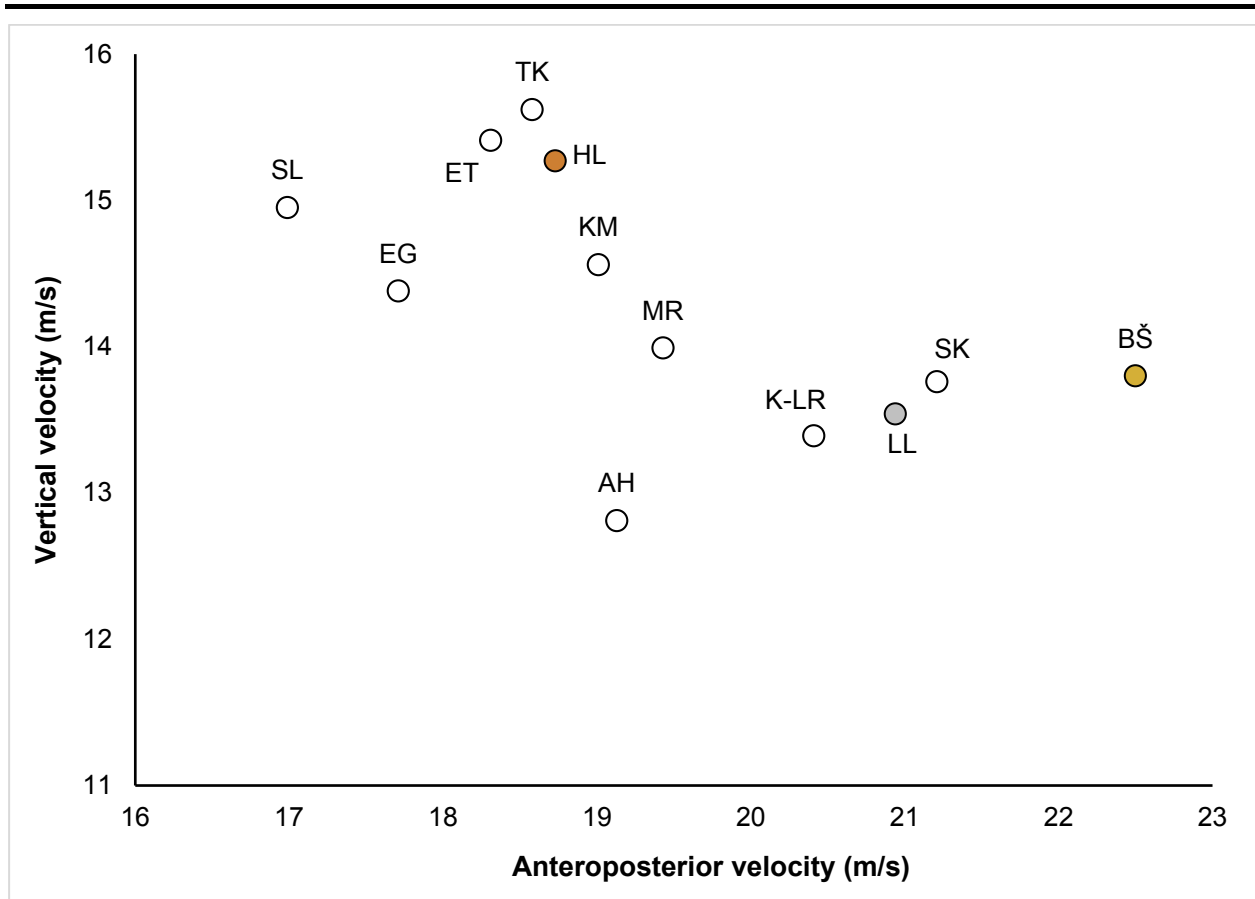
Figure 4. Horizontal (anteroposterior) and vertical components of javelin release velocity.

Table 4. Other javelin release angles.

	Attitude angle (°)	Angle of attack (°)	Sideslip (°)
ŠPOTÁKOVÁ	39.0	7.1	9.4
LI	34.9	4.1	1.5
LYU	43.8	5.6	12.0
KOLAK	34.6	3.6	10.7
TUGSUZ	35.6	−3.0	11.9
KHALADOVICH	37.7	−1.7	18.5
MOLITOR	38.9	2.6	−6.2
LIU	45.1	6.6	12.6
RATEJ	35.0	0.6	−9.2
ROBERTS	49.0	17.4	9.5
HJÁLMSDÓTTIR	44.2	12.3	17.5
GLEADLE	51.0	15.1	18.5

Note: A negative angle of attack indicates an angle of release that was greater than the angle of attitude. As all athletes in this event were right-handed throwers, a negative sideslip would indicate a sideslip to the left, whereas a positive angle indicates sideslip to the right.

Table 5. Upper body kinematics of each athlete at the point of release. All angles are expressed relative to the horizontal.

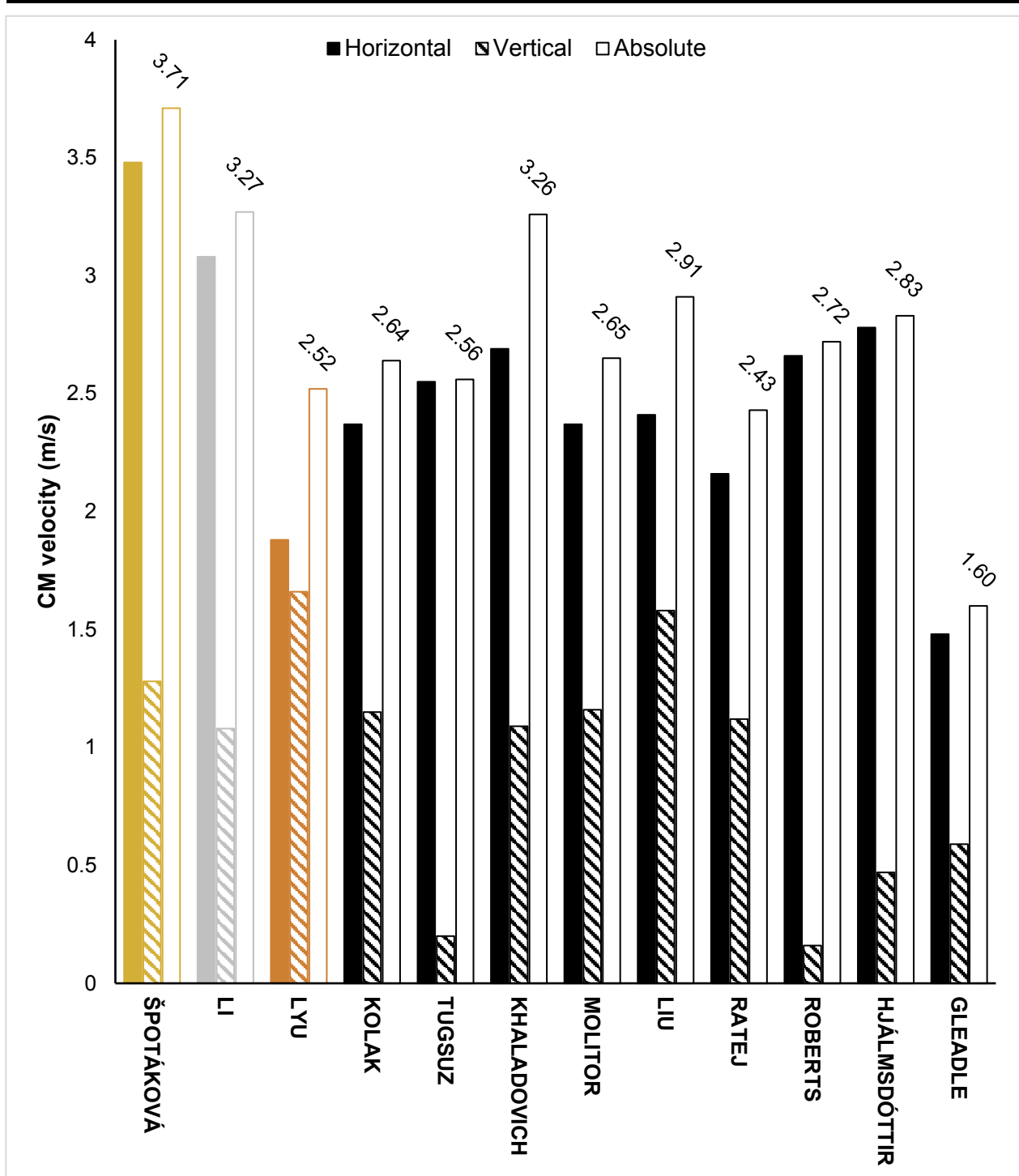|	Trunk angle (°)	Upper arm angle (°)	Forearm angle (°)
ŠPOTÁKOVÁ	61.5	24.8	55.0
LI	55.3	29.7	58.4
LYU	63.4	31.1	59.3
KOLAK	52.7	55.6	61.1
TUGSUZ	53.0	59.8	55.4
KHALADOVICH	67.6	26.3	49.3
MOLITOR	63.8	43.3	52.4
LIU	52.9	34.5	38.6
RATEJ	51.7	33.6	72.6
ROBERTS	58.3	57.0	50.1
HJÁLMSDÓTTIR	60.7	64.8	55.0
GLEADLE	59.6	46.7	54.8

Figure 5. Horizontal, vertical and absolute components of each athlete's centre of mass velocity at the point of javelin release. Absolute (resultant) velocity values are labelled above each white column.

Analysis of the approach phases

This section of the report presents key temporal information on the main phases of the women's javelin throw. The key phases are presented both in terms of absolute (Table 6 and Figure 6) and relative (Figure 7) terms. The athletes' approach characteristics are also show across the final 12 m of the runway, including approach velocity (Figure 8). Several technique variables are also presented as requested by the coaching collaborator (Table 8).

Table 6. Absolute duration of each analysed key phase before release.

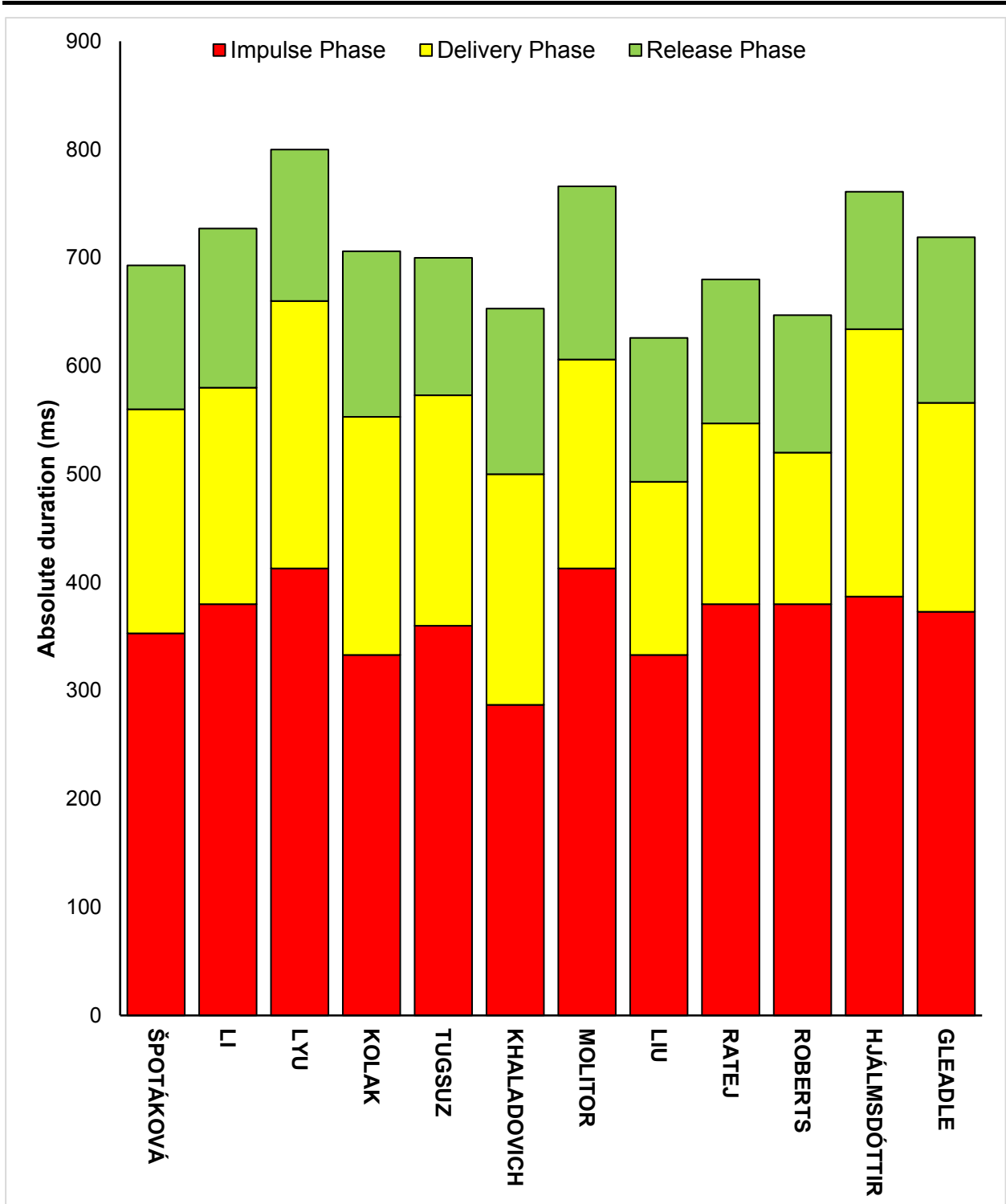|	Impulse phase (ms)	Delivery phase (ms)	Release phase (ms)
ŠPOTÁKOVÁ	353	207	133
LI	380	200	147
LYU	413	247	140
KOLAK	333	220	153
TUGSUZ	360	213	127
KHALADOVICH	287	213	153
MOLITOR	413	193	160
LIU	333	160	133
RATEJ	380	167	133
ROBERTS	380	140	127
HJÁLMSDÓTTIR	387	247	127
GLEADLE	373	193	153

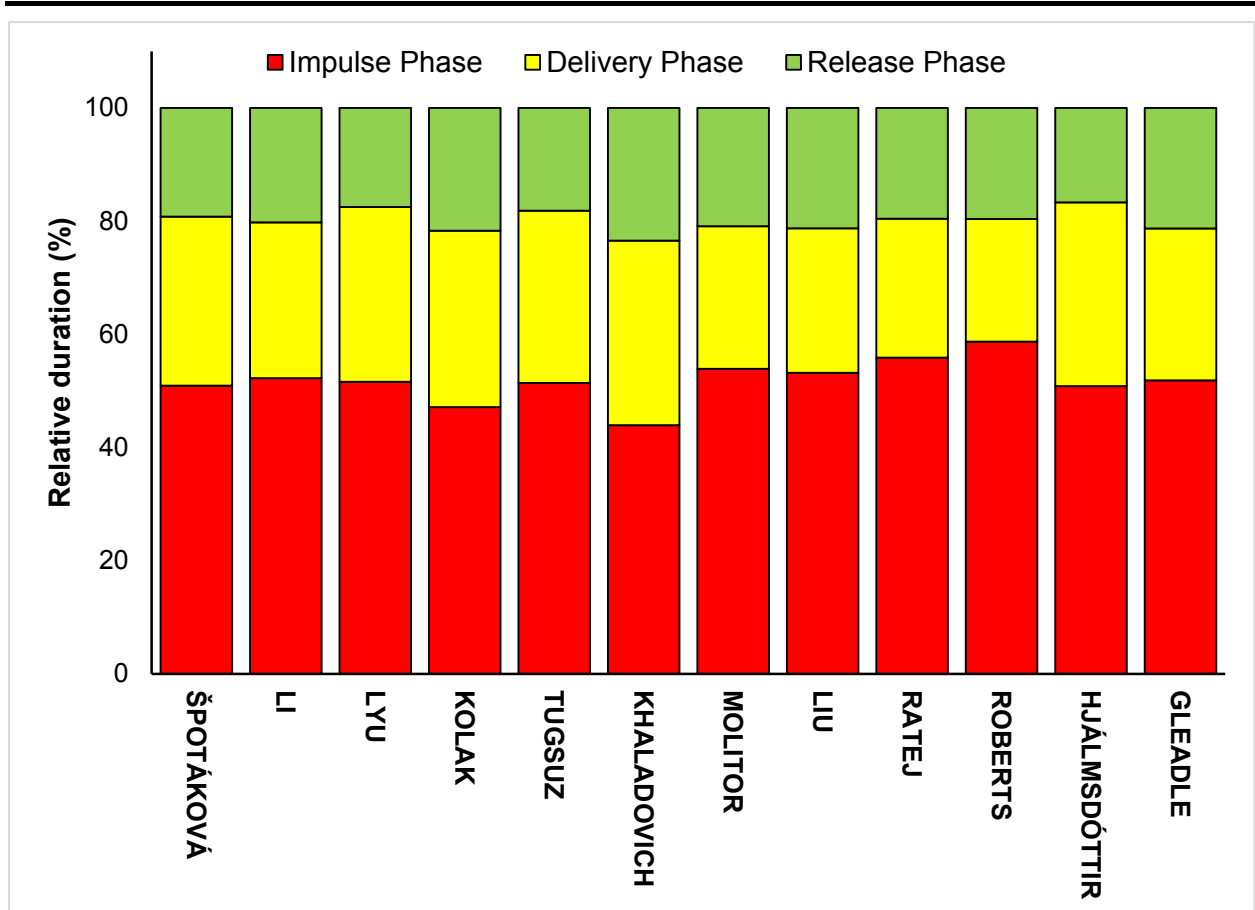Figure 6. Absolute durations of key phases before release.

Figure 7. Relative durations of key phases before release. 0 % indicates left foot contact at the start of the impulse phase and 100 % indicates javelin release.
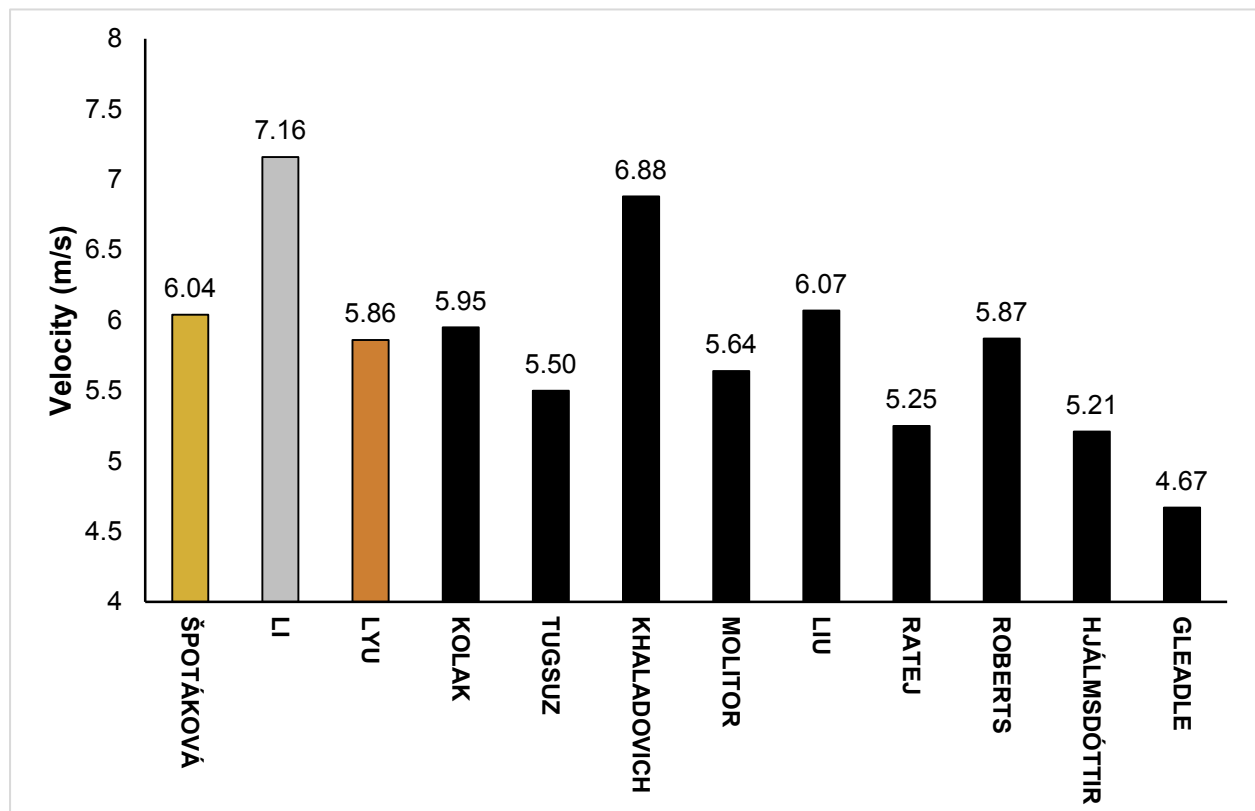

Figure 8. Approach velocity for each athlete at the start of the impulse stride phase.

Figures 9.1 to 9.12 show the motion path of each athlete's head during the final 12 m of approach. The solid black line indicates athlete's relative midline when entering last 12 m and the solid white line represents the foul line.
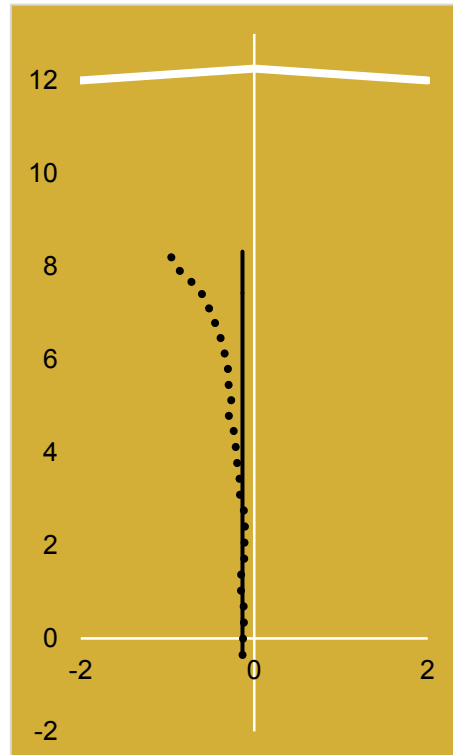

Figure 9.1. Absolute motion path of the head for Barbora Špotáková throughout the last 12 m of approach.

Figure 9.2. Absolute motion path of the head for Lingwei Li throughout the last 12 m of approach.

Figure 9.3. Absolute motion path of the head for Huihui Lyu throughout the last 12 m of approach.

Figure 9.4. Absolute motion path of the head for Sara Kolak throughout the last 12 m of approach.

Figure 9.5. Absolute motion path of the head for Eda Tugsuz throughout the last 12 m of approach.

Figure 9.6. Absolute motion path of the head for Tatsiana Khaladovich throughout the last 12 m of approach.

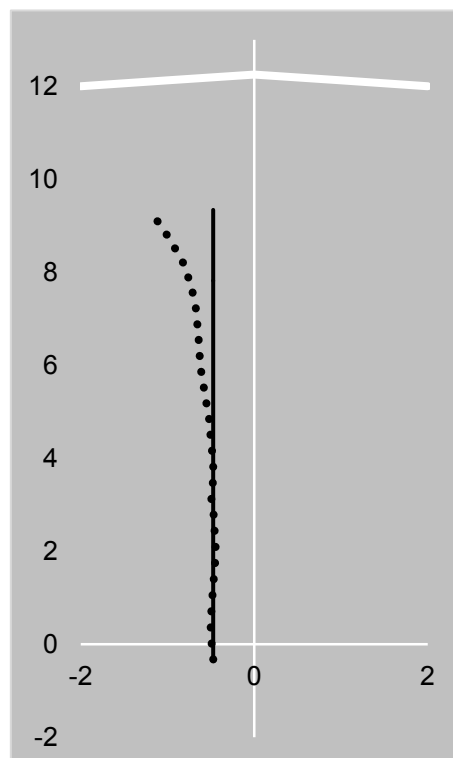Figure 9.7. Absolute motion path of the head for Katharina Molitor throughout the last 12 m of approach.
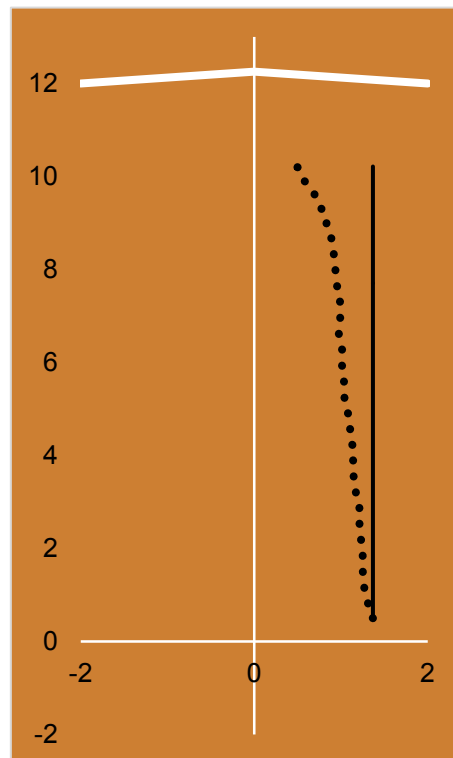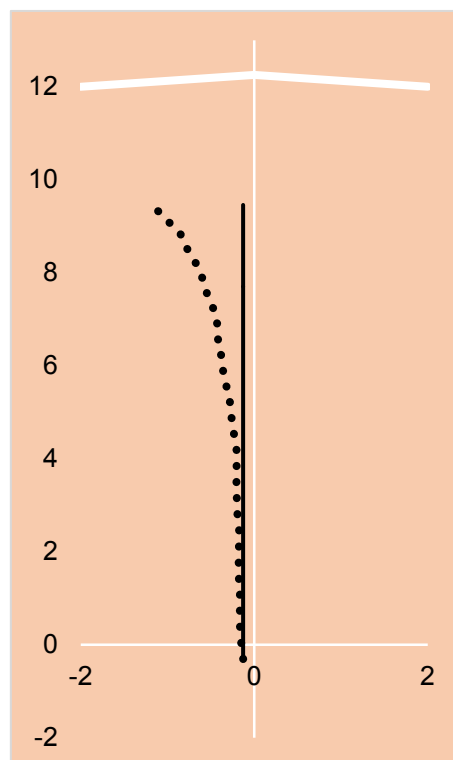

Figure 9.8. Absolute motion path of the head for Shiying Liu throughout the last 12 m of approach.
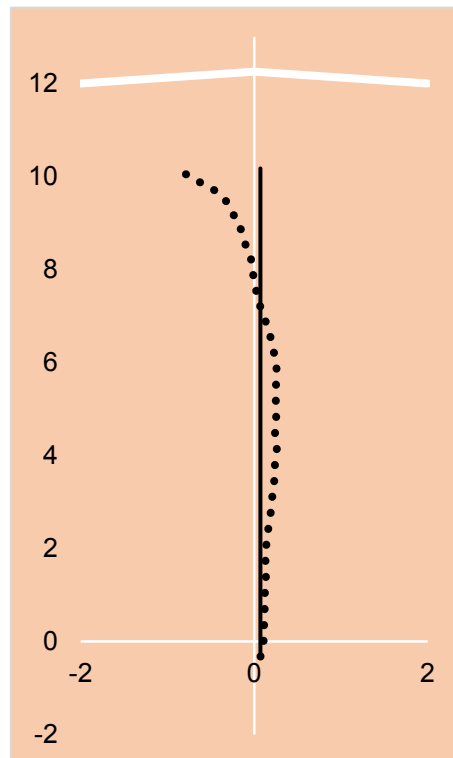
Figure 9.9. Absolute motion path of the head for Martina Ratej throughout the last 12 m of approach.
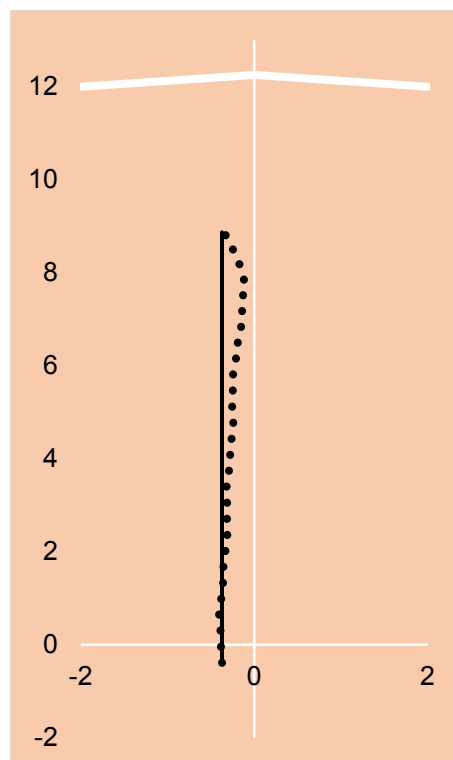
Figure 9.10. Absolute motion path of the head for Kelsey-Lee Roberts throughout the last 12 m of approach.
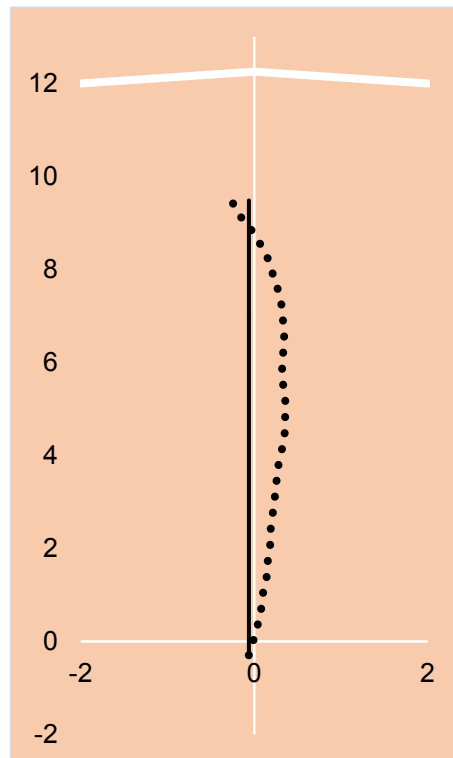
Figure 9.11. Absolute motion path of the head for Ásdís Hjálmsdóttir throughout the last 12 m of approach.

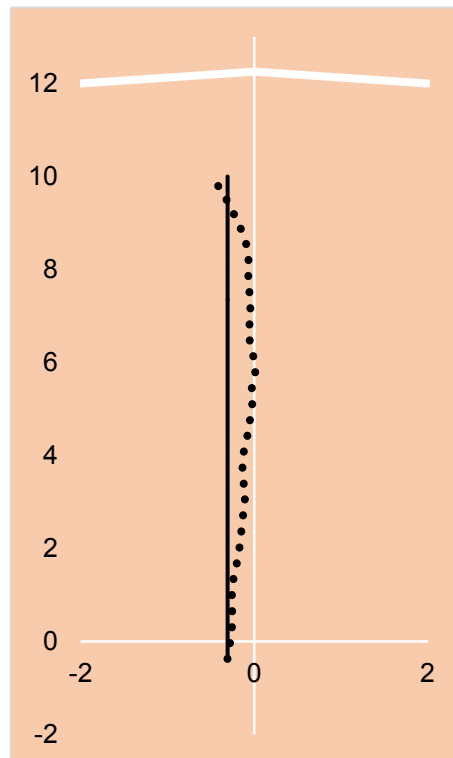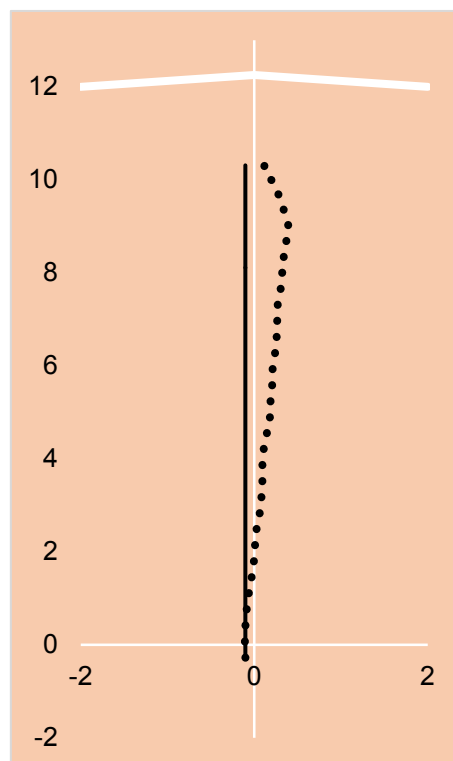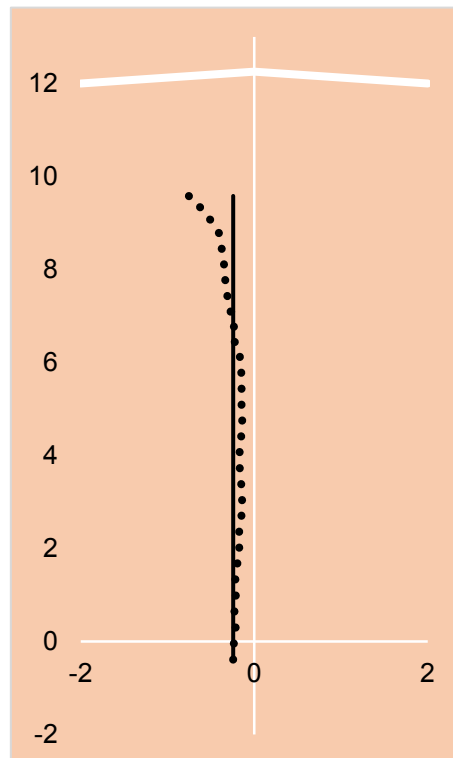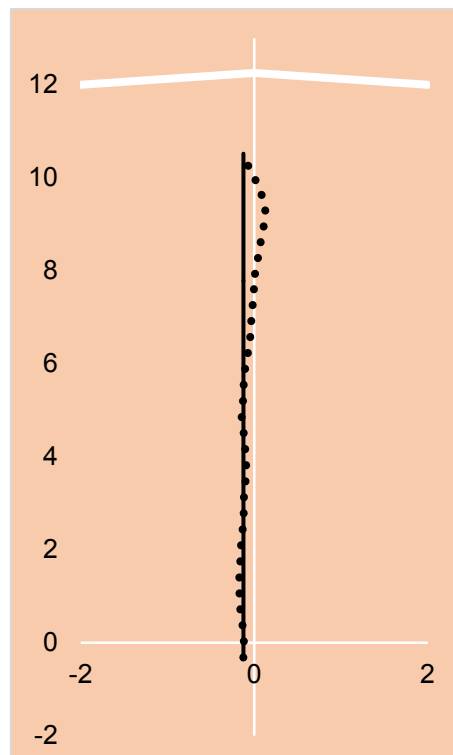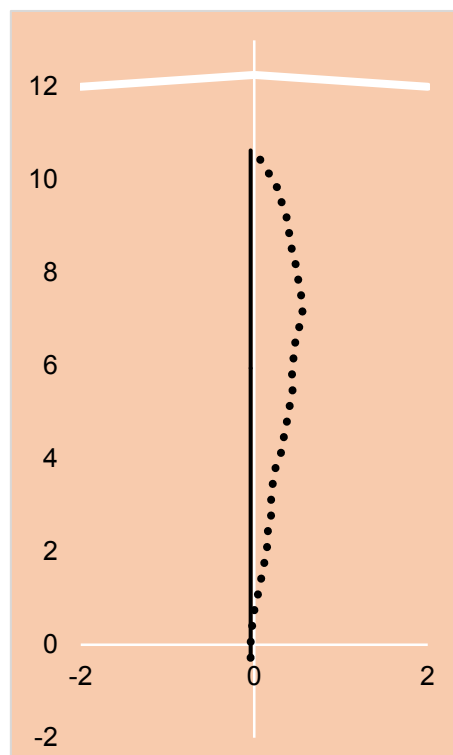Figure 9.12. Absolute motion path of the head for Elizabeth Gleadle throughout the last 12 m of approach.

Table 7. Various distance parameters for each athlete during different phases of the approach.

	D_{imp} (m)	D_{del} (m)	D_{FL} (m)
ŠPOTÁKOVÁ	1.85	1.47	3.53
LI	1.98	1.56	2.75
LYU	1.98	1.83	1.56
KOLAK	1.68	1.94	2.69
TUGSUZ	1.56	1.76	1.77
KHALADOVICH	1.48	1.72	1.49
MOLITOR	1.85	1.31	2.24
LIU	1.57	1.40	1.35
RATEJ	1.56	1.42	1.54
ROBERTS	1.61	1.40	2.97
HJÁLMSDÓTTIR	1.91	1.82	2.38
GLEADLE	1.12	1.42	1.09

Note: D_{imp} = distance covered during impulse phase; D_{del} = distance covered during delivery phase; D_{FL} = plant foot distance to the foul line at release.
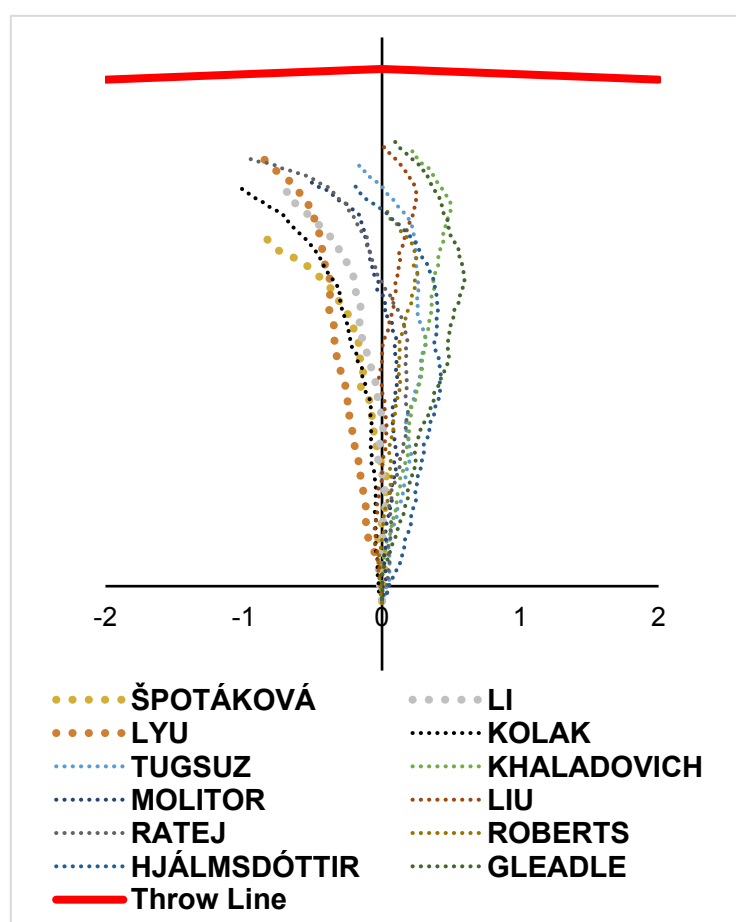
Figure 10. Relative motion path of each athlete's head during the last 12 m of approach.

Table 8. Other key variables requested by the coaching collaborator.

	CM-RF (m)	LF-JC (m)	TT-LTD (°)	SKF (°)
ŠPOTÁKOVÁ	−0.31	1.78	−16.9	189.5
LI	−0.31	1.77	−13.3	185.5
LYU	−0.23	1.74	−15.8	172.0
KOLAK	−0.18	1.75	−15.3	190.6
TUGSUZ	−0.28	1.72	−18.2	149.0
KHALADOVICH	−0.35	1.92	−18.1	164.1
MOLITOR	−0.30	1.87	−16.8	189.7
LIU	−0.23	1.66	−14.1	170.0
RATEJ	−0.16	1.89	−7.9	155.4
ROBERTS	−0.03	1.74	−13.2	145.9
HJÁLMSDÓTTIR	−0.23	1.82	−15.4	147.9
GLEADLE	−0.12	1.83	−25.9	173.8

Note: A negative CM-RF values indicates the right foot is ahead of the centre of mass. A negative TT-LTD angle indicates a backwards tilt of the trunk.

COACH'S COMMENTARY

General observations and comments on the final

Only 2.24 m separated the first 5 athletes. As in the men's event only two athletes improved in the last 3 rounds notably Huihui from China who improved from 7th to bronze in the 5th round. Only 6.64 m covered the whole field.

Release velocity and launch angles

In terms of release velocity, gold medal winner Barbora Špotáková had the highest recorded velocity of the finalists generating 26.42 m/s, this was 1.14 m/s faster than 4th placed Sara Kolak 25.28 m/s and 1.51 m/s quicker than silver medallist Li Lingwei who released the javelin at 24.91 m/s.

With a far superior release velocity I would've expected Špotáková's margin of victory to have been greater than the mere 51 cm. This can be explained by her release angle being 31.9° and her attitude angle of 39° giving her an angle of attack of 7.1° and a sideslip of 9.4°. These add a drag factor to the flight of the javelin slowing it down and restricting the distance. The silver medallist Li Lingwei on the other hand released the javelin much slower at 24.91 m/s but she had a smaller angle of attack 4.1° and a considerably smaller side slip angle of 1.5° meaning her javelin will have had a much cleaner flight with less drag slowing it down. The bronze medallist Lyu Huihui had the slowest release velocity of the top 6 throwers (24.17 m/s), but a much higher release angle (38.2°) than the gold and silver medallists. An attitude angle of 43.8° gave her an angle of attack of 5.6° and a relatively high angle of sideslip 12°. However, her javelin still managed to fly out to 65.26 m. Sara Kolak was 31 cm behind bronze in 4th place which is hard to believe when she had the second best release velocity of 25.28 m/s. In addition, Kolak's angle of release (30.9°), angle of attitude (34.6°), angle of attack (3.6°) and sideslip angle (10.7°); affected the flight enough to make her javelin fall short. The athlete in 10th place Kelsey-Lee Roberts generated a release velocity of 24.73 m/s but only threw 60.76 m due to her very poor attitude angle 49° compared to her release angle of 31.6°; therefore, giving her an angle of attack of 17.4°!

Run up velocity, impulse step, delivery stride and bracing leg knee angle (SKF) at release

For the three medallists, run up velocity at the start of the impulse step ranged from 7.16 m/s for Li Lingwei to 5.86 m/s for Lyu Huihui with gold medallist Barbora Špotáková between them travelling at 6.04 m/s as she began her impulse step. For a tall athlete Špotáková had a relatively small impulse step (D_{imp}) (1.85 m) compared to the two Chinese medallists (both covered 1.98 m). Although the size of the delivery step appeared very significant in the men's competition, it doesn't appear to be the case in the women's; gold medal winner Špotáková only had the 7th

largest with 1.47 m, Li Lingwei was 6th with 1.56 m and bronze medallist Lyu Huihui 2nd largest with 1.83 m.

A potentially significant factor was the block and level of knee bend at release (SKF angle), where 3 of the top throwers displayed a straighter bracing leg at release. If the knee bends at release it acts as a shock absorber as energy is dissipated rather than transferred up the kinetic chain through the body into the throwing arm. Špotáková (189.5°), Li (185.5°), and Kolak (190.6°) actually have hyperextended bracing leg angles at release whilst Lyu (172.0°) also had relatively straight leg at release. Interestingly, 7th place athlete Katharina Molitor stands out as having the second most hyperextended support knee at release (189.7°). However, other factors could have influenced Molitor's lower final distance, such as a lower release velocity (23.98 m/s) in comparison to the medallist's.

It was also noted that none of the women in the final dived after releasing the javelin (four of the 13 men's finalists did). Špotáková and Lingwei stopped very efficiently after release with plenty of room to spare before the scratch line, whilst bronze medallist Huihui was much closer to the scratch line. Sara Kolak who finished fourth only 31 cm behind bronze had room to spare that might have got her a medal!

A brief look at the top 8 finalists

Barbora Špotáková (Gold - 66.76 m) - Has a controlled run-up speed of 6.04 m/s at start of impulse step. Relatively small impulse step for such a tall athlete, she appears to turn her hips to the front after impulse. She has a small delivery stride. However, she sequences the throw very well and generates the quickest release velocity 26.42 m/s. She has very good javelin alignment very good release velocity. Her blocking left foot is long way from scratch line (3.53 m) which gives her lots of room to follow through and stop. Very good block, her front knee angle at release 189.5.

Lingwei Li (Silver - 66.25 m) - Is very fast on the run-up going at 7.16 m/s as she starts the impulse step. She has a good impulse stride 1.98 m and gives herself room to stop by having her left foot 2.75 m from the scratch line. Low release angle of 30.8° and an attitude angle of 34.9°, angle of attack 4.1° and side slip only 1.5°. Very clean throw with room to spare at the end and a very balanced recovery.

Huihui Lyu (Bronze - 65.26 m) - Much more javelin wrap after withdrawal into the delivery. This will clearly affect her speed which is 5.86 m/s at the start of the impulse phase. Runs down the right hand side of the run-up which possibly forces her to travel left as she goes towards delivery (see path of her head figure 10.3). She generates 24.17 m/s at release, attitude angle of 43.8°

which is very high and a release angle of 38.2°. Shows great skill and timing to only have a side slip angle of 12° at release as this could've been much more had she not straightened the javelin up when she started to apply force during delivery. This tendency to wrap the javelin in my opinion will slow her down on the run-up and makes it difficult to apply force down the length of the javelin with consistency under major championship pressure. Interestingly, she led the qualification round with a national record throw of 67.59 m but couldn't replicate this in the final.

Sara Kolak (4th - 64.95 m) - Pre-event favourite. Very good javelin alignment on the run-up plenty of room as her left foot plant is 2.69 m from the line. She has a very wide delivery stride 1.94 m (the longest of all the finalists). Her throwing sequence is very good onto a very good blocking left leg with a knee angle of 190.6° at release. She generated the 2nd best release velocity 25.28 m/s, an angle of release of 30.9°, an attitude angle of 34.6° resulting in an angle of attack of 3.6° with a sideslip angle of 10.7°. She appears to do a lot of cross-overs which hinder her ability to run faster. She drifts a long way left after the impulse. Possibly too much side slip cost her some distance.

Eda Tugsuz (5th - 64.52 m) - Lot of cross-overs leading into delivery could explain why she was relatively slow at start of the impulse step 5.5 m/s. Very good javelin alignment and arm position. She sequences the throw very well from the floor up. Attitude angle 35.6°, release angle 38.5° led to a minus 3° angle of attack and 11.9° of sideslip.

Tatsiana Khaladovich (6th - 64.05 m) - Is a tall athlete who was second fastest at the start of impulse step (6.88 m/s). She has a tendency to wrap the javelin at withdrawal which compromises her ability to have a good impulse stride which is small at 1.48 m. Her throwing sequence is very good, and she generated a release velocity of 24.76 m/s but because she wraps the javelin she hits across it and has a sideslip angle of 18.5° which probably cost her a few metres and the chance of a medal.

Katharina Molitor (7th - 63.75 m) - Has a very good linear technique, very balanced down the run-up with the javelin in a good position. She was travelling at 5.64 m/s at the start of the impulse phase and has an impulse step of 1.85 m the same as gold medal winner Barbora Špotáková. However, she has the shortest delivery step of all finalists (1.31 m) which limits her ability to accelerate the javelin and it leaves her hand at 23.98 m/s.

Shiying Liu (8th - 62.84 m) - She appears to give herself very little time and space to withdraw the javelin and get into position to set up the throw. At the start of the impulse she is going at 6.07 m/s and has an impulse step length of 1.57 m, the second smallest delivery stride of 1.40 m and has her left (blocking leg) only 1.35 m from the foul line. Her hips are front on and she does well to sequence the throw and stop.

Points to consider

There are of course many physiological and psychological factors that are unknown or very difficult to quantify that can positively or negatively impact a performance on the day of the competition.

The ability to compete under pressure is what usually separates the medallists from the other athletes in the field as they are usually closely matched physically. It's important to mention that the men's silver and bronze medallists Jacob Vadlejch and Petr Frydrych both produced lifetime best performances in the final and Li Lingwei produced a lifetime best to win the silver medal in the women's event, suggesting they got their preparations for the competition spot on.

Coach's comments and food for thought for coaches of male & female javelin throwers

- The ability to maintain good positions whilst moving quickly is definitely desirable.
- Generating a high release velocity in the javelin at release is still the number one aim of the thrower, closely followed by the need to find the best angles of release, attitude and sideslip that suits their physique, technique and rhythm.
- Understanding how improvements in physical attributes can enable coaches and athletes to make significant technical improvements to increase their personal best and progress the athlete towards their potential.
- Controlling the head position is important to enable balance throughout the different phases of the throw.

Male and female throwers may want to try the diving recovery as this seems to be a way of fully committing to the throw.

CONTRIBUTORS

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Mick Hill currently works at Leeds Beckett University as a Senior Coach and Manager. Mick was an international javelin thrower from 1983-2004, competing at 20 major events including four Olympic Games and 7 World Championships. Mick has been GB Throws and Head Coach during several Junior Championships, as well as being the UK National Javelin Squad Coach from 2004-2006. Mick also coached former Olympic gold medallist and world champion heptathlete Jessica Ennis from 2004 until her retirement in 2016.