

## Olympic Insights – Butterfly

### 100m Butterfly

At major competitions where athletes have to swim a heat, semi-final and final, strategies to progress through the rounds are important. At the Paris 2024 Olympic Games this was clearly seen in the Men's 100m Butterfly. Whilst most athletes swam faster in the semi-finals compared to the heats, it was only the top 4 who managed to then go faster in the final.

Podium athletes went around 0.2% faster from heat to semi-final but then were roughly 0.9% faster in the final compared to their semi-final efforts. The opposite was seen by all other finalists where they were on average 0.5% faster in the semi-final compared to the heat but then were 0.3% slower in the final compared to their semi-final efforts.

Interestingly, this was not the case for the Women's 100m Butterfly in Paris. All finalists (bar Hirai) were faster in the semi-final compared to their heat swim and the majority were then slower in the final compared to what they had previously swam in the semi. It is to be noted that Huske and Walsh (1<sup>st</sup> and 2<sup>nd</sup>) made massive drops in the semi-final from their heat swim compared to the rest of the field. The 1.29% drop and 2.47% drop they made respectively was far superior to any other finalists at the Games. Huske was able to then better this and drop another 0.74% for the final. However, it should be noted that these two swimmers were a class above the rest of the field; only six swimmers have ever gone below the 56 second mark.

The ability for Huske to cruise through the rounds and still be able to produce her fastest swim in the final shows how tactical progression through the rounds is important for top class athletes and can lead to medal winning performances.

Analysis of swim metrics from the Men's 100m Butterfly shows finalists tend to take 17-18 strokes on the first 50. A 57 rate down to a 56 rate with a 2m DPS appears to be how most male fly swimmers approached the first 50m of the race. However, the race was won on the second 50.

Podium athletes were on average 0.7s quicker on the second 50 than the rest of the field (26.66 < 27.31). Key differences are their ability to maintain a higher DPS at similar rates compared to their fellow competitors. 56-55 rate with a 2m DPS on the 2<sup>nd</sup> 50 were the metrics needed for a medal winning performance in Paris.

On the other hand, the Women's 100m Butterfly was won down the 1<sup>st</sup> 50m of the race. Podium athletes were 0.9s quicker down the first 50 (25.48 < 26.39). Finalists took on average 19 strokes but podium athletes has a much higher rate here than 4<sup>th</sup>-8<sup>th</sup> place with a higher DPS. Zhang is an anomaly in this race as she swims with a far higher rate than anyone else throughout the whole race but with a much lower DPS.

The 2<sup>nd</sup> 50m of the race was fairly similar across the field in terms of time but podium athletes took 1 less stroke than the rest of the field. All finalists had similar rates but medallists had a higher DPS.

Male and female medallists had faster free swim segments than all other finalists. In terms of skill analysis, male medallists had a smaller breakout distance on both the start and turn but were faster to 15m and achieved higher velocities on both skill pieces.

On the other hand, female medallists had greater breakout distances off the start and turn and had faster times to 15m with higher velocities. The two American swimmers are also have very strong under waters so faster times to 15m and greater breakout distances were expected from these two going into the meet.

## 200m Butterfly

As seen in the Men's 100m Butterfly, podium athletes were able to progress through the rounds with ease and able to pace their way to the final.

However, all finalists apart from Zirk (7<sup>th</sup>) and Razzetti (8<sup>th</sup>) swam their fastest race in the final and got quicker each round. The Women's event was different where all athletes were faster in the semi-final compared to the heat but only the medallists swam faster than that in the final. McIntosh and Smith were like Huske and Walsh in the 100m where they were a class above the rest of the field finishing 2s ahead of everyone else.

Male swim metrics from the 200m Butterfly show medallists being considerably faster on all splits apart from the 2<sup>nd</sup> 50. They are able to maintain higher rates with higher DPS throughout the whole race and take 1 less stroke per 50 than the rest of the field.

The female medallists on the other hand, are 1s faster on the 1<sup>st</sup> 50m of the race but make the most gains across the final 50m where McIntosh and Smith take 2s off the rest of the field. As with the men, female medallists swam the whole race with a higher rate and higher DPS than anyone else although they took the same amount of strokes as everyone else per 50 on average. The only difference came on the final 50m where medallists took 1 stroke less than the rest of the field.

Male medallists were far superior on their skills in the race. They had greater breakout distances off the start and every turn as well as faster times to 15m and higher velocities. They managed to maintain the high velocities they produced off each turn whereas the rest of the field got slower on each turn throughout the race. The same was seen in the women's event with the same maintenance of higher velocities off each turn being seen from the medallists but a drop off in speeds being seen from the rest of the finalists.

Free swim speeds were quicker overall by both male and female medallists by 1s in the men's event overall and 1.5s in the women's.

## Men's 100m Butterfly Workings

Top 8 Round to Round Time Drops Based on Athlete

Medalist (H/ SF/ F)	Heats	Semis	Finals	% Drop Heats to Semis	% Drop Semis to Finals	% Drop Heats to Finals
Milak (1st/ 1st/ 1st)	50.19	50.38	49.90	0.38	-0.96	-0.58
Liendo (2nd/ 3rd/ 2nd)	50.55	50.42	49.99	-0.26	-0.86	-1.12
Kharun (4th/ 6th/ 3rd)	50.71	50.68	50.45	-0.06	-0.46	-0.52
Ponti (3rd/ 5th/ 4th)	50.65	50.59	50.55	-0.12	-0.08	-0.20
Grousset (3rd/ 2nd/ 5th)	50.65	50.60	50.75	-0.10	0.30	0.20
Korstanje (8th/ 4th/ 6th)	51.17	50.68	50.83	-0.97	0.30	-0.67
Temple (7th/ 7th/ 7th)	50.89	50.95	51.10	0.12	0.29	0.41
Mizunuma (15th/ 8th/ 8th)	51.62	51.08	51.11	-1.06	0.06	-1.00

Observations: Medalists make biggest drop from semis-final with only top 4 getting quicker.

Top 8 Round to Round Time Drops Based on Position

Position	Heats	Semis	Finals	% Drop Heats to Semis	% Drop Semis to Finals	% Drop Heats to Finals
1	50.19	50.38	49.90	0.38	-0.96	-0.58
2	50.55	50.41	49.99	-0.28	-0.84	-1.12
3	50.65	50.42	50.45	-0.46	0.06	-0.40
4	50.71	50.59	50.55	-0.24	-0.08	-0.32
5	50.83	50.60	50.75	-0.45	0.30	-0.16
6	50.89	50.68	50.83	-0.41	0.30	-0.12
7	51.17	50.95	51.10	-0.43	0.29	-0.14
8	51.18	51.08	51.11	-0.20	0.06	-0.14
Slowest Time To Qualify	51.62	51.08	51.11	-1.06	0.06	-1.00

Observations: All get quicker heats - semis apart from winner of heats. Top 4 semis - final make biggest drop in time.

Paris 2024 50m Breakdown

Position	50 Split	Stroke Count	0-25 Stroke Rate	0-25 DPS	25-50 Stroke Rate	25-50 DPS
1	23.40	17	54.6	2.18	51.9	2.19
2	23.24	18	56.5	2.09	57.5	2.02
3	23.73	18	62.2	1.88	58.4	1.95
4	23.70	17	57.4	2.04	54.7	2.07
5	23.26	17	55.6	2.16	54.7	2.11
6	23.23	18	60.0	1.99	59.4	1.94
7	23.59	17	53.1	2.17	54.6	2.03
8	24.03	18	59.3	2.02	56.7	1.96
Podium Average	23.46	17.67	57.77	2.05	55.93	2.05
4-th - 8th Average	23.56	17.40	57.06	2.06	56.02	2.02

**Observations:**

All finalists take 17 / 18 strokes down first 50 -> Same as previous championships.

Rates are similar to previous major champs.

DPS very random and no correlation really for medalists

All finalists have similar 50m splits, Milak and Liendo slightly quicker

Major Champs 2019-2023 Average 50m Breakdown

Position	50 SR	50SC
1	55.2	17.0
2	56.8	17.8
3	55.1	17.5
4	54.8	17.7
5	53.6	17.3
6	55.0	17.5
7	57.5	18.3
8	56.6	17.3
Average	55.6	17.6
Standard deviation	1.2	0.4
Minimum	50.2	16.0
Maximum	61.3	19.0

Paris 2024 100m Breakdown

Position	100 Split	Stroke Count	50-75 Stroke Rate	50-75 DPS	75-100 Stroke Rate	75-100 DPS
1	26.50	18	53.3	2.10	51.0	2.13
2	26.75	20	56.9	1.99	56.1	1.89
3	26.72	20	57.5	1.91	56.7	1.89
4	26.85	19	57.8	1.95	57.0	1.85
5	27.49	20	55.1	1.96	54.4	1.95
6	27.60	20	58.1	1.85	56.9	1.84
7	27.51	19	54.6	1.99	53.2	1.92
8	27.08	20	58.7	1.89	57.3	1.83
Podium Average	26.66	19.33	55.90	2.00	54.60	1.97
4-th - 8th Average	27.31	19.60	56.86	1.93	55.76	1.88

**Observations:**

Milak has lowest stroke count and rate on 2nd 50 but highest DPS

Medalists maintain higher DPS 75-100 than rest of finalists with similar rates

Medalists have faster 2nd 50 splits by a big margin (excluding Ponti = 0.3s)

Major Champs 2019-2023 Average 100m Breakdown

Position	100 SR	100SC
1	54.6	18.8
2	56.7	20.0
3	56.9	19.5
4	54.9	20.0
5	54.6	19.0
6	55.9	19.5
7	58.2	20.7
8	56.3	20.3
Average	56.0	19.7
Standard deviation	1.2	0.6
Minimum	51.9	19.0
Maximum	61.1	22.0

Skills Analysis						
Position	Start			Turn		
	Breakout distance	Time to 15m	Velocity	Breakout distance	Time to 15m	Velocity
1	14.51	5.25	3.48	12.93	7.42	2.02
2	15.12	5.22	3.52	13.51	7.41	2.03
3	14.64	5.48	3.37	13.14	7.40	2.03
4	15.82	5.36	3.26	15.09	7.21	2.08
5	13.89	5.42	3.45	12.06	7.86	1.93
6	15.80	5.36	3.28	13.68	7.58	1.98
7	15.44	5.25	3.42	13.78	7.38	2.05
8	14.66	5.70	3.24	13.40	7.62	1.98
Podium Average	14.76	5.32	3.46	13.19	7.41	2.03
4-th - 8th Average	15.12	5.42	3.33	13.60	7.53	2.00

Free Swim Analysis					
Position	Free Swim Times				
	15-25	25-45	65-75	75-95	Total
1	5.04	10.54	5.35	11.02	31.95
2	5.08	10.36	5.30	11.35	32.09
3	5.13	10.53	5.46	11.22	32.34
4	5.12	10.58	5.31	11.40	32.41
5	5.00	10.42	5.55	11.30	32.27
6	5.02	10.43	5.57	11.46	32.48
7	5.21	10.82	5.54	11.77	33.34
8	5.02	10.80	5.42	11.42	32.66
Podium Average	5.08	10.48	5.37	11.20	32.13
4-th - 8th Average	5.07	10.61	5.48	11.47	32.63

#### Considerations around the meet:

- Previous events: 200IM, 100Fr, 200Fly, 50Fr, 4x100Fr
- 100 Fly was Day 7 of the meet → normally between Day 3-5
- 2 finalists swam the 4x100 men's medley relay heat the morning of the final → Korstanje and Mizunuma.
- 3 of the finalists swam the 4x100 mixed medley relay final an hour after the 100m fly final → Temple, Liendo and Korstanje.
- Some finalists had to race 300m fly on the day of the final
  
- People who raced other events on the day of the 100m fly final:
  - Korstanje 4x100 med heat
  - Mizunuma 4x100 med heat
  - Kharun 4x100 med heat
  - Temple 4x100 mix med final
  - Liendo 4x100 mix med final
  - Korstanje 4x100 mix med final

## Women's 100m Butterfly Workings:

Top 8 Round to Round Time Drops Based on Position						
Position	Heats	Semis	Finals	% Drop Heats to Semis	% Drop Semis to Finals	% Drop Heats to Finals
1	56.50	55.38	55.59	-2.02	0.38	-1.64
2	56.71	56.00	55.63	-1.27	-0.67	-1.94
3	56.72	56.15	56.21	-1.02	0.11	-0.91
4	56.75	56.55	56.42	-0.35	-0.23	-0.58
5	56.79	56.55	56.44	-0.42	-0.19	-0.62
6	56.90	56.74	56.93	-0.28	0.33	0.05
7	57.00	56.80	57.19	-0.35	0.68	0.33
8	57.46	56.93	57.34	-0.93	0.72	-0.21
Slowest Time To Qualify	57.90	58.11	57.34	0.36	-1.34	-0.98

Top 8 Round to Round Time Drops Based on Athlete						
Medalist (H/SF/F)	Heats	Semis	Finals	% Drop Heats to Semis	% Drop Semis to Finals	% Drop Heats to Finals
Huske (3rd / 2nd / 1st)	56.72	56.00	55.59	-1.29	-0.74	-2.03
Walsh (4th / 1st / 2nd)	56.75	55.38	55.63	-2.47	0.45	-2.01
Zhang (1st / 3rd / 3rd)	56.50	56.15	56.21	-0.62	0.11	-0.52
Kohler (6th / 4th / 4th)	56.90	56.55	56.42	-0.62	-0.23	-0.85
Mac Neil (7th / 4th / 5th)	57.00	56.55	56.44	-0.80	-0.19	-0.99
Mckeeon (5th / 6th / 6th)	56.79	56.74	56.93	-0.09	0.33	0.25
Hirai (2nd / 7th / 7th)	56.71	56.80	57.19	0.16	0.68	0.84
Hansson (12th / 8th / 8th)	57.57	56.93	57.34	-1.12	0.72	-0.40

Paris 2024 50m Breakdown						Major Champs 2019-2023 Average 50m Breakdown			
Position	50 Split	Stroke Count	0-25 Stroke Rate	0-25 DPS	25-50 Stroke Rate	25-50 DPS	Position	50 SR	50SC
1	25.61	19	59.6	1.83	56.3	1.89	1	57.1	19.5
2	25.40	18	58.9	1.81	55.1	1.94	2	56.3	19.5
3	25.42	21	70.3	1.58	61.9	1.71	3	56.8	19.5
4	26.35	20	56.5	1.83	54.4	1.91	4	57.6	19.3
5	25.94	20	62.0	1.76	59.2	1.74	5	56.2	19.5
6	26.40	19	55.8	1.92	52.7	1.91	6	53.7	19.0
7	26.66	20	60.0	1.79	58.4	1.75	7	54.6	19.3
8	26.61	20	57.0	1.83	54.6	1.83	8	56.3	18.3
Podium Average	25.48	19.33	62.93	1.74	57.77	1.85	Average	56.1	19.3
4-th - 8th Average	26.39	19.80	58.26	1.83	55.86	1.83	Standard deviation	1.2	0.4
<b>Observations:</b>						Minimum	51.5	18.0	
Podium athletes take roughly 1 stroke less down first 50 than rest of field (Zhang exception with V. high rate and count)						Maximum	61.7	20.0	
All finalist's rates similar except for Zhang who is a lot higher									
Podium athletes have higher DPS 25-50 (Zhang exception to rest of field)									
Podium athletes through to 50 far quicker than rest of finalists									

Paris 2024 100m Breakdown						Major Champs 2019-2023 Average 100m Breakdown			
Position	100 Split	Stroke Count	50-75 Stroke Rate	50-75 DPS	75-100 Stroke Rate	75-100 DPS	Position	100 SR	100SC
1	29.98	22	56.7	1.77	58.3	1.66	1	57.7	22.0
2	30.23	20	54.1	1.76	52.2	1.79	2	55.7	22.8
3	30.79	24	58.8	1.67	56.8	1.64	3	55.8	22.8
4	30.07	24	58.4	1.72	56.7	1.71	4	57.9	23.0
5	30.50	23	62.6	1.63	60	1.53	5	57.5	23.0
6	30.53	23	55.3	1.81	53.4	1.76	6	55.9	23.0
7	30.53	22	61.9	1.61	59.1	1.58	7	55.9	23.3
8	30.73	24	56.7	1.71	57.2	1.63	8	53.7	23.0
Podium Average	30.33	22.00	56.53	1.74	55.77	1.70	Average	56.3	22.9
4-th - 8th Average	30.47	23.20	58.98	1.70	57.28	1.64	Standard deviation	1.3	0.4
<b>Observations:</b>						Minimum	51.8	21.0	
Podium athletes faster on 2nd 50 than other finalists apart from Zhang who has the slowest 2nd 50 of the field						Maximum	59.7	26.0	
Podium athletes take nearly 2 strokes less on 2nd 50 than other finalists (excluding Zhang)									
Huske and Walsh have highest DPS for whole 50 compared to field - Zhang has low DPS but rates higher									
Huske maintains high rate throughout race, Walsh's rates drop in the second 50 as does Zhang									

Stroke Count Comparisons		
Position	Paris 2024 Overall Strokes	2019-2023 Avg Overall SC
1	41	41.5
2	38	42.3
3	45	42.3
4	44	42.3
5	43	42.5
6	42	42.0
7	42	42.7
8	44	41.3
Podium Average	41.3	42.0
4-th - 8th Average	43.0	42.2

**Observations:**

Podium athletes take 2 strokes less than rest of finalists on average. Also 1 stroke less than previous championship finalists

Number of Extra Strokes Taken on 2nd 50		
Position	Paris 2024 Extra Strokes On 2nd 50	2019-2023 Avg Extra Strokes On 2nd 50
1	3	2.5
2	2	3.3
3	3	3.3
4	4	3.7
5	3	3.5
6	4	4.0
7	2	4.0
8	4	4.7
Podium Average	2.7	3.00
4-th - 8th Average	3.4	3.97

**Observations:**

Podium athletes take 1 stroke less on second 50 than rest of finalists on average  
Similar trend to previous finalists at major champs

Skills Analysis						
Position	Start			Turn		
	Breakout distance	Time to 15m	Velocity	Breakout distance	Time to 15m	Velocity
1	15.25	6.01	2.94	13.23	8.58	1.75
2	15.53	5.83	3.00	15.00	8.10	1.85
3	15.33	5.95	2.95	11.39	8.65	1.73
4	14.47	6.22	2.89	9.31	8.84	1.71
5	15.69	6.27	2.87	13.93	8.43	1.77
6	14.47	6.17	2.92	10.35	8.69	1.77
7	15.14	6.45	2.69	15.17	8.51	1.76
8	15.00	6.18	2.92	11.86	8.61	1.73
Podium Average	15.37	5.93	2.96	13.21	8.44	1.78
4-th - 8th Average	14.95	6.26	2.86	12.12	8.62	1.75

**Observations:**

Podium athletes had biggest breakout distances on start and turn  
Podium athletes were fastest to 15m off start and turn  
Podium athletes had highest velocities off start, similar to other finalists on turn  
American girls very good SCY and SCM so expect strong under water

Free Swim Analysis					
Position	Free Swim Times				
	15-25	25-45	65-75	75-95	Total
1	5.50	11.27	5.97	12.41	35.15
2	5.61	11.20	6.22	12.83	35.86
3	5.40	11.33	6.11	12.91	35.75
4	5.82	11.54	5.97	12.40	35.73
5	5.50	11.67	5.87	13.11	36.15
6	5.60	11.94	6.00	12.74	36.28
7	5.58	11.76	6.02	12.87	36.23
8	5.74	12.04	6.18	12.84	36.80
Podium Average	5.50	11.27	6.10	12.72	35.59
4-th - 8th Average	5.65	11.79	6.01	12.79	36.24

**Observations:**

Apart from Walsh, podium athletes are faster 15-25m  
Podium athletes faster 25-45m  
Podium athletes do not accelerate out of breakout into free swim as much as other finalists do  
Overall free swimming is faster by podium athletes

## Considerations around the meet:

- First event of the meet
- Heat and semi same day as Women's 4x100fr relay

# Men's 200m Butterfly Workings:

Top 8 Round to Round Time Drops Based on Athlete						
Medalist (H/SF/F)	Heats	Semis	Finals	% Drop Heats to Semis	% Drop Semis to Finals	% Drop Heats to Finals
Marchand (6th/2nd/1st)	115.26	113.50	111.21	-1.55	-2.06	-3.64
Milak (1st/1st/2nd)	113.92	112.72	111.75	-1.06	-0.87	-1.94
Kharun (3rd/3rd/3rd)	114.06	114.01	112.80	-0.04	-1.07	-1.12
Chmielewski (7th/6th/4th)	115.28	114.26	113.90	-0.88	-0.33	-1.21
Ponti (3rd/4th/5th)	114.77	114.14	114.14	-0.55	0.00	-0.55
Espenberger (5th/6th/6th)	115.19	114.62	114.17	-0.50	-0.39	-0.89
Zirk (10th/5th/7th)	115.52	114.22	114.55	-1.14	0.29	-0.85
Rozzetti (4th/7th/8th)	114.78	114.51	114.85	-0.24	0.30	0.06

Observations: Majority of finalists get quicker each round. Podium athletes make biggest drop SF-F. Top 3 progress as top 3 through each round (apart from Marchand out of heat in 6th).

Free Swim Analysis									
Position	Free Swim Times								
	15-25	25-45	65-75	75-95	115-125	125-145	165-185	185-195	Total
1	5.34	11.24	5.95	11.83	6.63	11.63	5.35	11.53	70.38
2	5.22	10.93	5.84	11.92	5.58	11.99	6.00	12.59	70.07
3	5.33	11.06	5.77	11.87	5.97	12.06	5.36	12.45	70.37
4	5.43	11.54	5.74	11.99	5.84	12.18	6.18	12.21	71.11
5	5.59	11.16	5.74	12.03	5.70	12.53	5.72	12.67	71.14
6	5.47	11.08	5.88	11.43	6.04	12.27	5.98	12.14	70.30
7	5.54	11.26	5.80	11.93	6.05	12.18	6.29	12.74	71.79
8	5.35	11.27	5.85	11.79	6.00	12.51	6.03	13.24	72.04
Podium Average	5.38	11.08	5.87	11.87	5.88	11.98	5.36	12.32	70.27
4th - 8th Average	5.48	11.29	5.80	11.93	5.83	12.33	6.04	12.60	71.29

Observations: Podium have fastest free swim times on nearly every segment (only 65-75m slower)

Skills Analysis												
Position	Start			Turn 1			Turn 2			Turn 3		
	Breakout distance	Time to 15m	Velocity	Breakout distance	Time to 15m	Velocity	Breakout distance	Time to 15m	Velocity	Breakout distance	Time to 15m	Velocity
1	15.87	5.65	3.12	14.95	7.90	1.90	13.20	8.17	1.85	14.11	8.26	1.82
2	15.31	5.39	3.29	13.46	8.02	1.88	11.75	8.20	1.84	11.11	8.57	1.77
3	15.68	5.74	3.04	13.82	8.10	1.86	12.52	8.44	1.80	12.39	8.49	1.80
4	15.46	5.78	3.06	11.59	8.71	1.76	10.25	8.67	1.75	10.16	8.82	1.73
5	15.52	5.72	3.10	11.41	8.37	1.80	12.14	8.49	1.77	13.73	8.69	1.72
6	13.62	6.40	2.80	11.03	8.61	1.80	10.77	8.78	1.73	10.45	8.67	1.75
7	15.52	5.86	2.93	13.51	8.40	1.80	12.26	8.74	1.72	11.77	8.96	1.69
8	14.23	6.01	3.00	13.19	8.26	1.83	11.57	8.44	1.81	10.82	8.55	1.78
Podium Average	15.62	5.59	3.15	14.08	8.01	1.88	12.49	8.27	1.83	12.54	8.44	1.80
4th - 8th Average	14.87	5.95	2.98	12.15	8.47	1.80	11.40	8.62	1.76	11.39	8.74	1.73

Observations:  
Podium athletes had biggest breakout distances on start and turns  
Podium athletes fastest to 15m off every wall and start  
Podium athletes keep same velocities off wall off every turn but rest the of the final drop on every turn

Paris 2024 50m Breakdown						
Position	50 Split	Stroke Count	0-25 Stroke Rate	0-25 DPS	25-50 Stroke Rate	25-50 DPS
1	24.96	17	54.4	1.99	52.3	2.04
2	24.32	15	48.4	2.38	47.1	2.33
3	25.06	17	56.2	2.00	51.2	2.12
4	25.29	19	58.7	1.88	53.8	1.93
5	25.23	16	49.4	2.17	46	2.34
6	25.79	18	52.9	2.07	50.5	2.15
7	25.39	17	49.7	2.18	49.9	2.14
8	25.23	16	47.9	2.34	47.6	2.24
Podium Average	24.78	16.33	53.00	2.12	50.20	2.16
4th - 8th Average	25.39	17.20	51.72	2.13	49.56	2.16

Observations:  
Podium athletes take 1 stroke less on 1st 50 than rest of podium with the same DPS as rest of final, just with a higher stroke rate  
Podium athletes take big lead in first 50 (0.71s faster on 1st 50)  
4th-8th similar to previous major champs

Major Champs 2019-2023 Average 50m Breakdown			
Position	50 SR	50SC	
1	50.8	16.8	
2	56.8	18.8	
3	52.4	17.3	
4	48.0	15.5	
5	48.8	16.0	
6	53.7	18.0	
7	48.1	16.0	
8	51.9	17.3	
Average	51.3	16.9	
Standard deviation	2.9	1.0	
Minimum	46.9	15.0	
Maximum	61.2	20.0	

Paris 2024 100m Breakdown						
Position	100 Split	Stroke Count	50-75 Stroke Rate	50-75 DPS	75-100 Stroke Rate	75-100 DPS
1	28.50	18	49.2	2.04	48.9	2.08
2	28.54	17	46.5	2.21	45.4	2.22
3	28.61	18	50.9	2.05	50.1	2.02
4	29.11	21	53.2	1.96	52.2	1.92
5	29.03	17	45.3	2.31	44.0	2.27
6	28.84	20	50.4	2.02	49.9	2.10
7	28.63	18	48.1	2.15	49.4	2.04
8	28.67	17	45.8	2.24	47.2	2.16
Podium Average	28.55	17.67	48.87	2.10	48.13	2.11
4th - 8th Average	28.86	18.60	48.56	2.14	48.54	2.10

Observations:  
Podium take 1 stroke fewer on average but have same SR and DPS as rest of final  
2nd 50 Split similar times on average - podium 0.3s quicker  
Swam 2nd 50 similar to previous major champs

Major Champs 2019-2023 Average 100m Breakdown			
Position	100 SR	100SC	
1	48.1	17.5	
2	53.2	20.0	
3	50.4	18.8	
4	45.1	18.5	
5	46.2	18.0	
6	51.5	20.0	
7	46.8	17.5	
8	50.1	20.0	
Average	48.9	18.7	
Standard deviation	2.6	1.0	
Minimum	44.4	17.0	
Maximum	55.8	21.0	

Paris 2024 150m Breakdown							Major Champs 2019-2023 Average 150m Breakdown		
Position	150 Split	Stroke Count	100-125 Stroke Rate	100-125 DPS	125-150 Stroke Rate	125-150 DPS	Position	150 SR	150SC
1	28.78	19	50.9	1.96	50.5	2.01	1	48.3	18.8
2	28.66	18	47.0	2.29	46.5	2.15	2	53.3	21.0
3	29.37	19	50.2	2	50.4	1.98	3	51.2	20.0
4	29.49	22	54.9	1.87	53.1	1.86	4	46.7	19.0
5	29.55	18	47.5	2.22	45.2	2.12	5	47.1	19.0
6	29.91	20	51.4	1.93	48.7	2.01	6	50.7	20.5
7	29.74	19	47.3	2.1	49.1	2.01	7	47.4	19.5
8	29.69	19	47.8	2.09	47.5	2.02	8	49.4	20.7
Podium Average	28.94	18.67	49.37	2.08	49.13	2.05	Average	49.2	19.8
4-th - 8th Average	29.68	19.60	49.78	2.04	48.72	2.00	Standard deviation	2.2	0.8
<b>Observations:</b>							Minimum		
Podium swim 3rd 50 a lot faster than rest of finalists							45.0		
Podium maintain higher DPS on 3rd 50 than rest of final and do it with 1 stroke fewer							Maximum		
							55.8		
							23.0		

Paris 2024 200m Breakdown							Major Champs 2019-2023 Average 200m Breakdown		
Position	200 Split	Stroke Count	150-175 Stroke Rate	150-175 DPS	175-200 Stroke Rate	175-200 DPS	Position	200 SR	200SC
1	28.97	19	51.3	1.95	51.3	1.96	1	48.6	19.3
2	30.23	19	48.3	2.07	46.6	2.05	2	54.5	22.0
3	29.76	20	52.2	1.96	51.4	1.87	3	52.4	21.8
4	30.01	23	55.1	1.76	53.5	1.84	4	51.6	21.5
5	30.33	20	54.5	1.93	51.3	1.85	5	49.3	20.5
6	29.63	22	52.6	1.90	52.1	1.90	6	52.2	22.0
7	30.79	21	49.8	1.92	50.5	1.86	7	48.9	21.0
8	31.26	21	49.6	2.01	48.7	1.86	8	50.3	22.7
Podium Average	29.65	19.33	50.60	1.99	49.77	1.96	Average	50.9	21.3
4-th - 8th Average	30.40	21.40	52.32	1.90	51.22	1.86	Standard deviation	1.9	1.0
<b>Observations:</b>							Minimum		
Podium faster on final 50							47.4		
Podium maintain higher DPS on final 50 with 2 strokes fewer and a lower SR							Maximum		
							57.7		
							24.0		

## Event Considerations:

- 400IM had been previously which many finalists had swam
- 200m Breastroke in same session
- Marchand had raced 1600m already before the 200m fly final
- 200 Fly before the 100m fly
- For other fly swimmers like Milak was first race of meet
- Marchand had 2Fly, 2Brst double



## Women's 200m Butterfly Workings:

Top 8 Round to Round Time Drops Based on Athlete						
Medalist (H/SF/F)	Heats	Semis	Finals	% Drop Heats to Semis	% Drop Semis to Finals	% Drop Heats to Finals
McIntosh (1st/1st)	127.70	124.87	123.03	-2.27	-1.50	-3.80
Smith (2nd/2nd)	128.99	125.39	123.84	-1.28	-1.25	-2.54
Zhang (1st/3rd)	126.55	126.09	125.09	-0.36	-0.80	-1.17
Dekkers (8th/4th)	128.97	126.17	127.11	-2.22	0.74	-1.46
Bach (4th/5th)	127.34	126.46	127.11	-0.70	0.51	-0.18
Shackell (5th/6th)	127.49	126.65	127.73	-0.66	0.85	0.19
Connor (3rd/7th)	127.13	127.10	128.15	-0.02	0.82	0.80
Stephens (14th/8th)	130.46	127.53	128.82	-2.30	1.99	-1.27

Observations: Only podium get quicker each round. McIntosh and Smith drop 4 seconds from heat to final.

Free Swim Analysis									
Position	Free Swim Times								
	15-25	25-45	65-75	75-95	115-125	125-145	165-185	185-195	Total
1	5.83	11.99	6.41	12.91	6.53	12.86	6.54	13.26	76.43
2	6.11	12.20	6.47	12.87	6.76	13.30	6.81	13.50	78.02
3	5.74	11.93	6.59	13.14	6.52	13.63	6.88	14.11	78.54
4	6.20	12.25	6.40	12.85	6.41	13.09	6.98	14.45	78.83
5	6.18	12.40	6.46	12.84	6.63	13.05	6.93	14.01	78.50
6	5.87	12.52	6.46	13.17	6.30	13.95	6.85	14.84	79.96
7	6.09	12.69	6.38	13.03	6.53	13.60	6.91	14.31	79.54
8	6.10	12.45	6.40	12.91	6.71	13.40	7.04	14.36	79.37
Podium Average	5.89	12.04	6.49	12.97	6.64	13.26	6.74	13.62	77.66
4-th - 8th Average	6.09	12.46	6.42	12.96	6.52	13.42	6.94	14.39	79.20

Skills Analysis												
Position	Start			Turn 1			Turn 2			Turn 3		
	Breakout distance	Time to 15m	Velocity	Breakout distance	Time to 15m	Velocity	Breakout distance	Time to 15m	Velocity	Breakout distance	Time to 15m	Velocity
1	12.84	6.60	2.74	8.09	9.24	1.72	7.81	9.18	1.68	8.17	9.33	1.68
2	15.69	6.37	2.69	11.96	9.29	1.63	12.14	9.07	1.67	13.22	8.93	1.69
3	15.16	6.42	2.74	11.08	8.86	1.73	8.73	9.34	1.66	7.75	9.44	1.67
4	12.38	6.92	2.60	9.09	9.38	1.64	9.15	9.44	1.64	8.00	9.82	1.62
5	14.53	7.02	2.52	9.81	9.48	1.63	9.84	9.59	1.60	9.95	9.73	1.60
6	14.08	6.82	2.57	11.64	9.04	1.69	11.16	9.43	1.61	11.17	9.65	1.58
7	15.11	6.88	2.52	9.71	9.16	1.72	8.74	9.59	1.59	7.96	9.26	1.75
8	13.75	6.97	2.51	9.41	9.69	1.59	8.39	9.80	1.53	8.37	10.16	1.54
Podium Average	14.56	6.48	2.72	10.34	9.13	1.69	9.56	9.20	1.67	9.71	9.23	1.68
4-th - 8th Average	13.97	6.92	2.54	9.53	9.35	1.65	9.46	9.57	1.59	9.09	9.72	1.62

Observations:  
Podium athletes average further breakout distances, higher velocities and faster times to 15m

Paris 2024 50m Breakdown							Major Champs 2019-2023 Average 50m Breakdown		
Position	50 Split	Stroke Count	0-25 Stroke Rate	0-25 DPS	25-50 Stroke Rate	25-50 DPS	Position	50SR	50SC
1	27.38	19	52.9	1.95	51.3	1.95	1	53.0	20.0
2	27.60	20	56.7	1.73	55.7	1.77	2	53.6	20.8
3	27.08	19	59.1	1.77	53.8	1.87	3	55.3	20.8
4	28.39	20	51.9	1.87	50.1	1.96	4	54.5	20.5
5	28.72	20	55.4	1.75	52.8	1.83	5	50.0	19.3
6	28.26	19	52.5	1.95	49.7	1.93	6	54.2	20.0
7	28.67	18	50.1	1.97	48.2	1.96	7	49.9	19.3
8	28.71	19	50.0	1.97	49.9	1.93	8	49.4	19.5
Podium Average	27.35	19.33	56.23	1.82	53.60	1.86	Average	52.5	20.0
4-th - 8th Average	28.55	19.20	51.98	1.90	50.14	1.92	Standard deviation	2.2	0.6
Observations: Podium a lot quicker in the first 50 of race							Minimum	47.1	18
Finalists all take between 18-20 strokes but podium have higher rate with lower DPS							Maximum	57.4	22

Paris 2024 100m Breakdown							Major Champs 2019-2023 Average 100m Breakdown		
Position	100 Split	Stroke Count	50-75 Stroke Rate	50-75 DPS	75-100 Stroke Rate	75-100 DPS	Position	100SR	100SC
1	31.59	23	49.9	1.88	50.2	1.85	1	51.2	23.8
2	31.76	23	54.5	1.70	54.6	1.71	2	52.3	23.3
3	31.73	22	51.5	1.77	49.6	1.84	3	53.5	24.0
4	31.73	22	48.6	1.93	49.2	1.9	4	51.6	23.0
5	31.83	23	52.0	1.79	52.1	1.79	5	48.5	21.7
6	31.71	22	50.8	1.83	50.6	1.80	6	53.1	24.5
7	31.79	22	46.4	2.03	48.1	1.92	7	50.2	21.7
8	32.14	23	50.6	1.85	50.0	1.86	8	48.8	23.5
Podium Average	31.69	22.67	51.97	1.78	51.47	1.80	Average	51.1	23.2
4-th - 8th Average	31.84	22.40	49.68	1.89	50.00	1.85	Standard deviation	1.7	1.0
Observations: Similar split times between podium and finalists on average							Minimum	48	20
Stroke count average 22 which is one less than previous major champs							Maximum	55.1	25
Podium have higher stroke rate with a lower DPS									

Paris 2024 150m Breakdown							Major Champs 2019-2023 Average 150m Breakdown		
Position	150 Split	Stroke Count	100-125 Stroke Rate	100-125 DPS	125-150 Stroke Rate	125-150 DPS	Position	150 SR	150SC
1	31.73	24	50.9	1.78	51.6	1.81	1	51.9	24.5
2	32.14	23	53.8	1.65	53.5	1.69	2	52.5	24.3
3	32.62	24	50.4	1.83	50.3	1.75	3	53.2	24.5
4	32.14	23	51.0	1.84	50.9	1.80	4	54.2	24.5
5	32.51	23	51.6	1.75	51.2	1.80	5	49.8	23.0
6	32.97	23	51.5	1.85	50.9	1.69	6	53.6	25.5
7	33.66	24	48.9	1.88	49.1	1.80	7	50.1	22.7
8	33.16	24	50.4	1.77	50.2	1.78	8	49.7	25.0
Podium Average	32.16	23.67	51.70	1.75	51.80	1.75	Average	51.9	24.2
4-th - 8th Average	32.89	23.40	50.68	1.82	50.46	1.77	Standard deviation	1.7	0.9
<b>Observations:</b>							Minimum		
McIntosh has fastest 3rd 50 split by 0.4s compared to rest of field							Maximum		
4th-8th have lower SR compared to previous major champs									
DPS compared to SR higher for podium athletes									
Paris 2024 200m Breakdown							Major Champs 2019-2023 Average 200m Breakdown		
Position	200 Split	Stroke Count	150-175 Stroke Rate	150-175 DPS	175-200 Stroke Rate	175-200 DPS	Position	200 SR	200SC
1	32.33	25	53.2	1.72	51.8	1.75	1	53.4	26.0
2	32.34	23	54.6	1.61	55.1	1.61	2	53.7	24.5
3	33.66	25	51.0	1.71	50.9	1.67	3	53.6	25.3
4	34.85	26	52.9	1.82	50.9	1.63	4	54.8	26.0
5	34.05	25	52.1	1.66	51.5	1.66	5	51.5	24.3
6	34.79	25	53.7	1.63	52.5	1.54	6	53.5	27.0
7	34.03	26	50.0	1.74	50.5	1.66	7	50.4	24.3
8	34.81	24	49.3	1.73	48.4	1.73	8	49.7	25.5
Podium Average	32.78	24.33	52.93	1.68	52.60	1.68	Average	52.6	25.4
4-th - 8th Average	34.51	25.20	51.60	1.68	50.76	1.64	Standard deviation	1.7	0.9
<b>Observations:</b>							Minimum		
Podium take less strokes than rest of field and previous podium athletes from major champs							Maximum		
Podium athletes far quicker on final 50 (McIntosh & Smith faster by 2s from 4th-8th and 1s faster than Zhong)									
Podium have higher rate and DPS than rest of field in last 25m									

## Event Considerations:

- Few finalists had already raced multiple events before the 2Fly (100fly, 4IM, 2free)
- Later in schedule → Thursday
- For others was first event
- Women's 4x200 final conflicting event in same session
- 2IM following day