



PROFESSIONAL GOLF EQUIPMENT AT DOWN TO EARTH PRICES

Weight - A Close Look at Component Weights and What it Means to You

with Jeff Summitt

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Thursday, June 23, 2011

2-3PM Eastern Standard Time

Audio settings are set on listen only.

Please post questions in the upper right hand corner Chat box.

Question & Answer period will be at end of webinar.

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Selecting the Proper Weight Golf Clubs and Components Parts

- Light is trendy now, but is light right for you?
- Before you build or buy a club, you need to know what weight you or your customer needs before ordering them!
- Discuss what weight (or mass) is and it's purpose
- Discuss overall weight, heft and moment of inertia
- Discuss balance along the entire length of golf club

Club Head Mass – Drivers

$$V(b) = V(h) \times \frac{(1 + e)}{1 + (m/M)}$$

V(b) = Velocity of the ball immediately after impact

V(h) = Velocity of the head immediately before impact

m = Mass of the ball (46g)

M = Mass of the driver (typical range is between 190-210g)

e = The coefficient of restitution (we will use the 0.83 limit by the USGA)

Ball Speed	Head Mass	Ball Speed	Ball Speed	Distance	Ball Speed	Head Mass	Ball Speed	Ball Speed	Distance
Miles/hour	Grams	Meters/sec	Miles/hour	Yards	Miles/hour	Grams	Meters/sec	Miles/hour	Yards
100	190	66.3	147.3	250.4	80	190	53.0	117.8	200.2
100	195	66.6	148.0	251.6	80	195	53.3	118.4	201.3
100	200	67.0	148.9	253.1	80	200	53.6	119.1	202.5
100	205	67.3	149.5	254.2	80	205	53.8	119.5	203.2
100	210	67.6	150.2	255.4	80	210	54.0	120.0	204.0

Club Head Mass – Putters

$$V(b) = V(h) \times \frac{(1 + e)}{1 + (m/M)}$$

V(b) = Velocity of the ball immediately after impact

V(h) = Velocity of the head immediately before impact

m = Mass of the ball (46g)

M = Mass of a putter head (average 340g, but can range between 295g to more than 420g)

e = The coefficient of restitution (we will use 0.80 for the putter)

Head Mass	Ball Speed	Ball Speed	Distance	Ball Speed	Head Mass	Ball Speed	Ball Speed	Distance
Grams	Meters/sec	Miles/hour	Ft / in.	Miles/hour	Grams	Meters/sec	Miles/hour	Ft / in.
320	2.83	6.3	9' 7.9"	8.2	320	5.82	12.9	19' 10.4"
340	2.85	6.3	9' 8.7"	8.2	340	5.87	13.0	20' 0.4"
360	2.87	6.4	9' 9.5"	8.2	360	5.91	13.1	20' 2"
380	2.89	6.4	9' 10.3"	8.2	380	5.94	13.2	20' 3.3"
400	2.91	6.5	9' 11.2"	8.2	400	5.97	13.3	20' 4.5"

Fitting for Putter Head Mass

- If you or one of your customer is constantly short of the hole, then choose a heavier putter head
- If you or one of your customer is consistently past the hole, then possibly use a lighter putter head
- For slow greens, a heavier putter head may be in order
- For lightening fast greens, a lighter putter head may be more appropriate

Shaft Weight (Mass)

- Which weighs more, an 85g steel shafts or an 85 gram graphite shaft?
- Graphite shafts are usually associated with lighter weights, but now there is some cross over.
- Cut steel shafts for a #5 iron can range from 77 - 122g, while graphite can range 50-110g range.
- Cut graphite driver shafts can range (at this time) from 42-104, but 60-70g is still most popular.

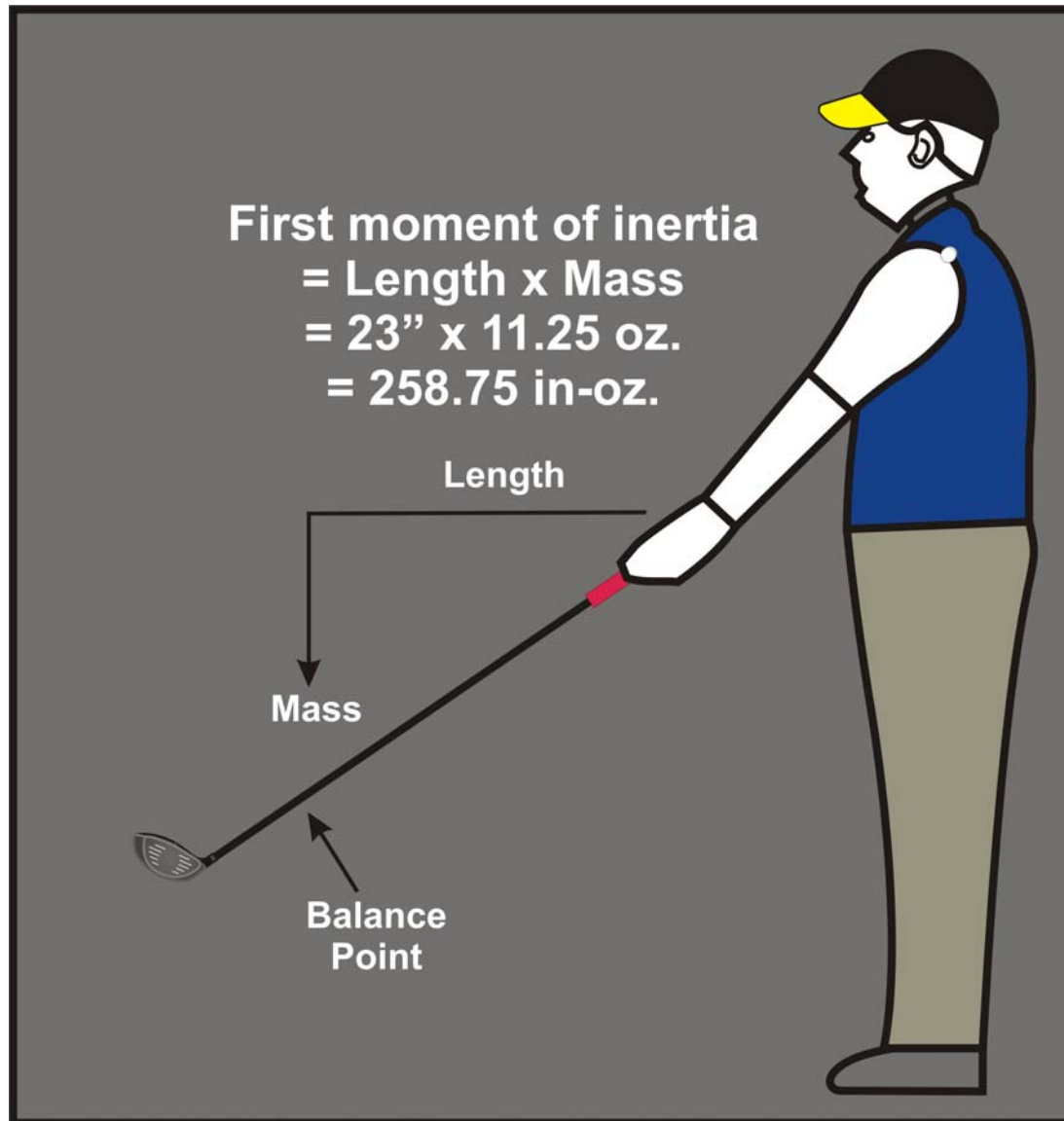
Grip Weight (Mass)

- For years, standard men's grip weight (non-putters) remained 50g
- Non-putter grips can now weight between 20g and 115g
- Putter grips can range from 57g to 270g
- Size plays an important factor when comparing weights of similar materials (rubber vs. synthetic)

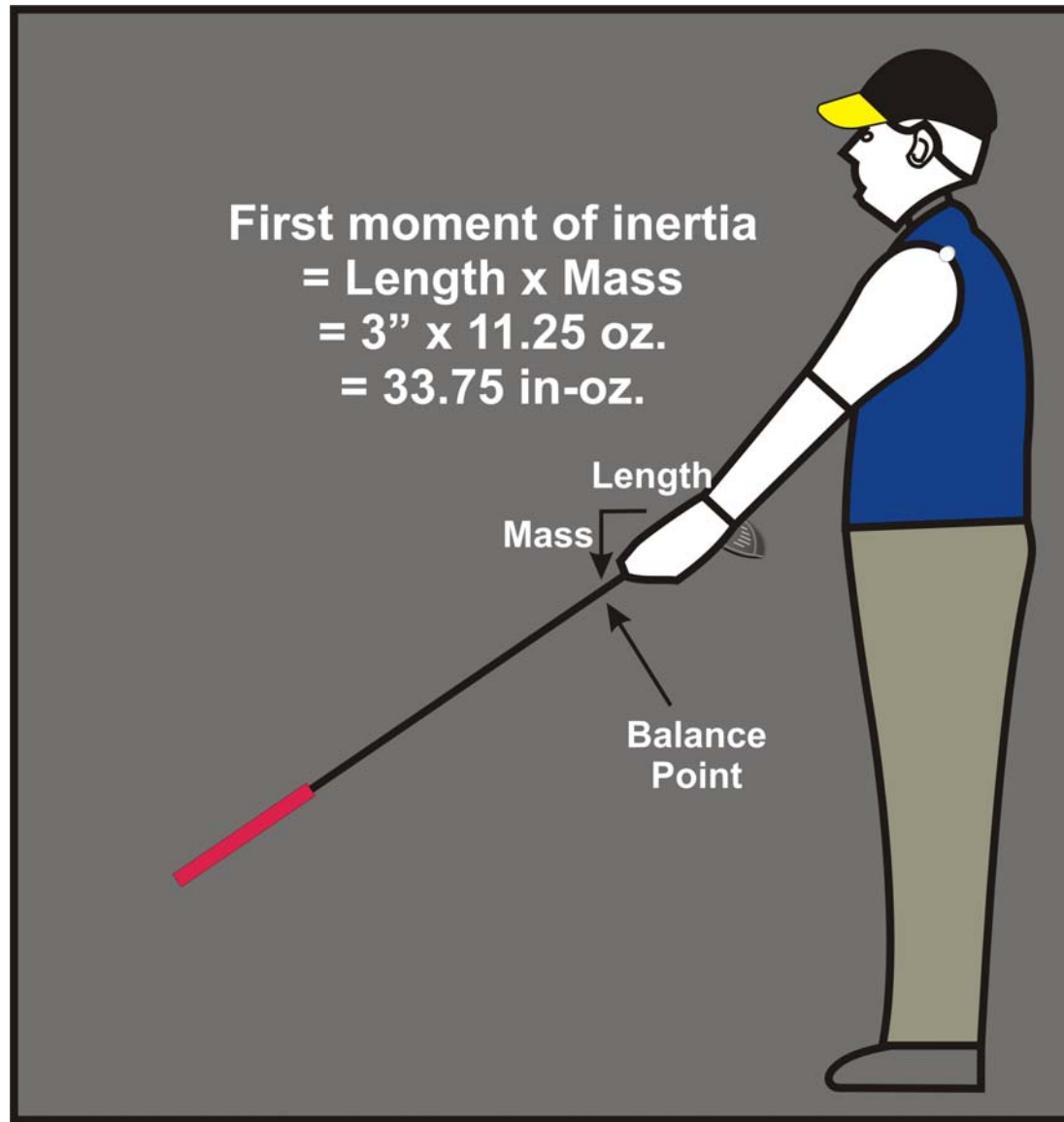
Overall (or) Static Weight (Mass)

- Sum of all masses such as the head, shaft, grip and small supplies (i.e. ferrule, epoxy, swingweighting plugs and grip tape) combined
- Picking incorrect weight can lead to:
 - Frustration
 - High Scores
 - Fatigue (at least too heavy)
 - Injury (to self or others)
- Overall weight is a factor that influences how fast you can swing the club

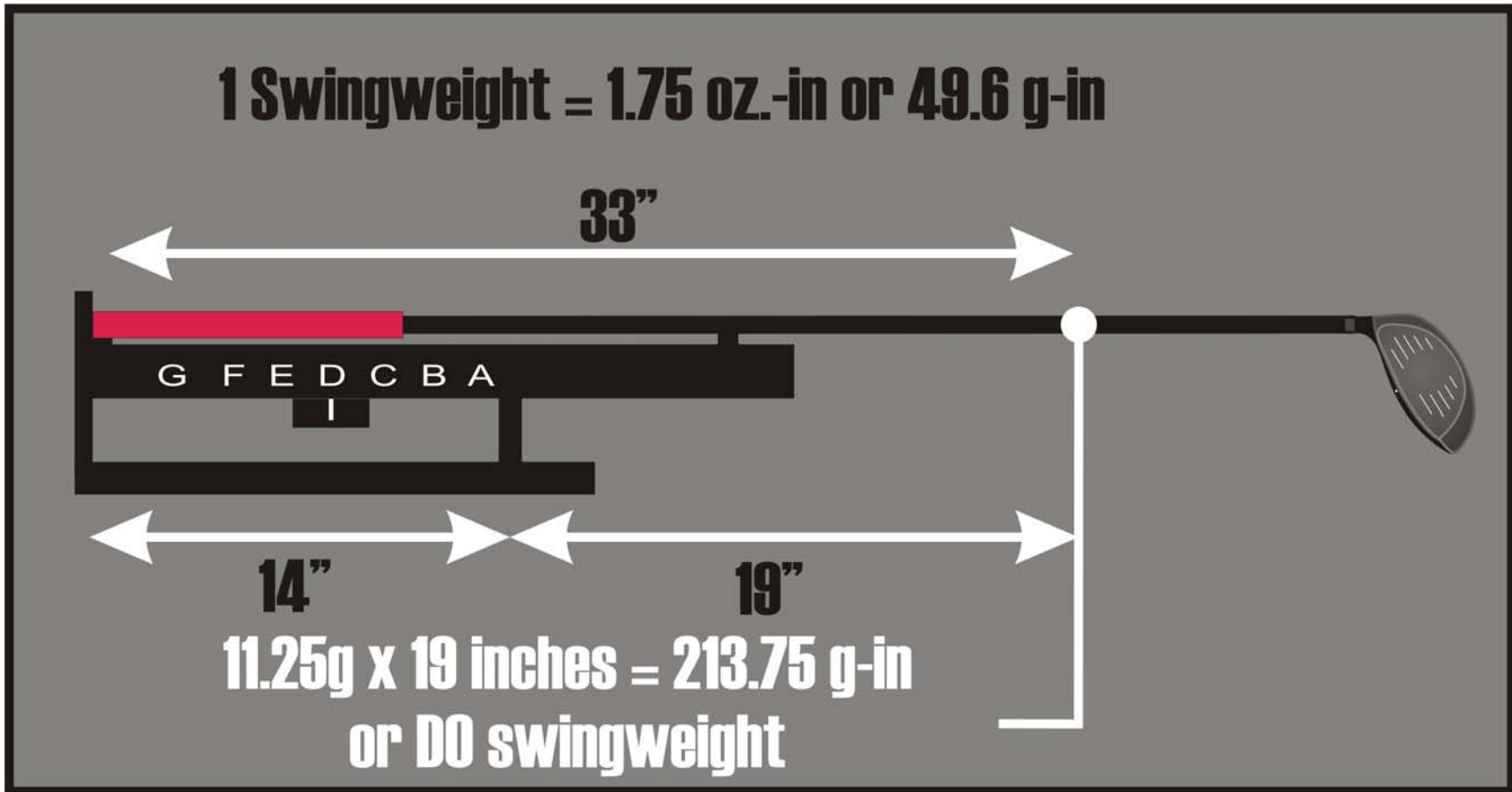
Heft – Accessing the weight by lifting



First Moment of Inertia

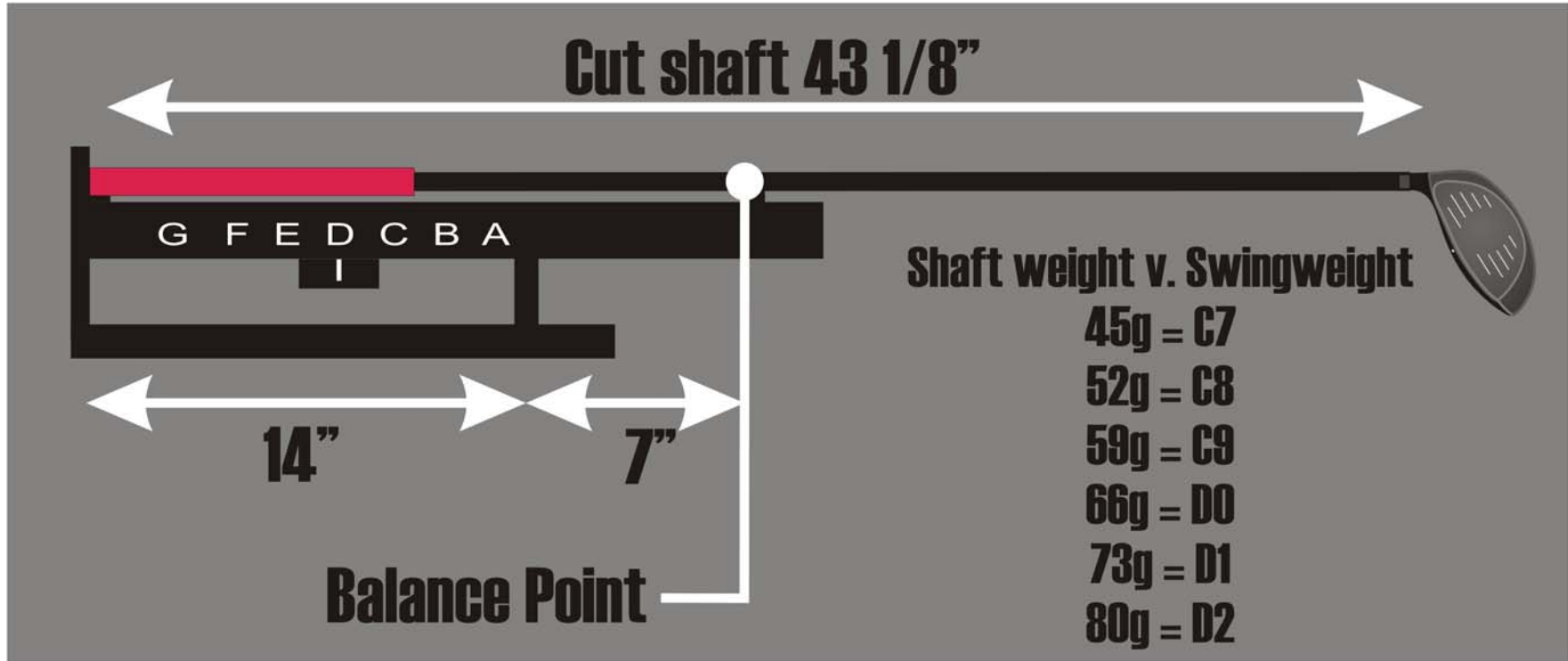


Swingweight



Length	Weight	Club	Length	Weight	Club	Length	Weight	Club
45"	200	Driver	39.5"	242	3HY	36"	277	8-iron
43"	208	3W	39"	249	4HY	35.5"	284	9-iron
42"	218	5W	38"	256	5 iron	35.25"	291	PW
41"	228	7W	37.5"	263	6 iron	35"	298	SW
40"	235	2HY	37"	270	7 iron	34"	340	Putter

Shaft Weight



**On a 45" driver,
 $\Delta 7g$ of shaft weight = $\Delta 1$ swingweight
This is the reason drivers are becoming longer**

Force Equals Mass Times Acceleration

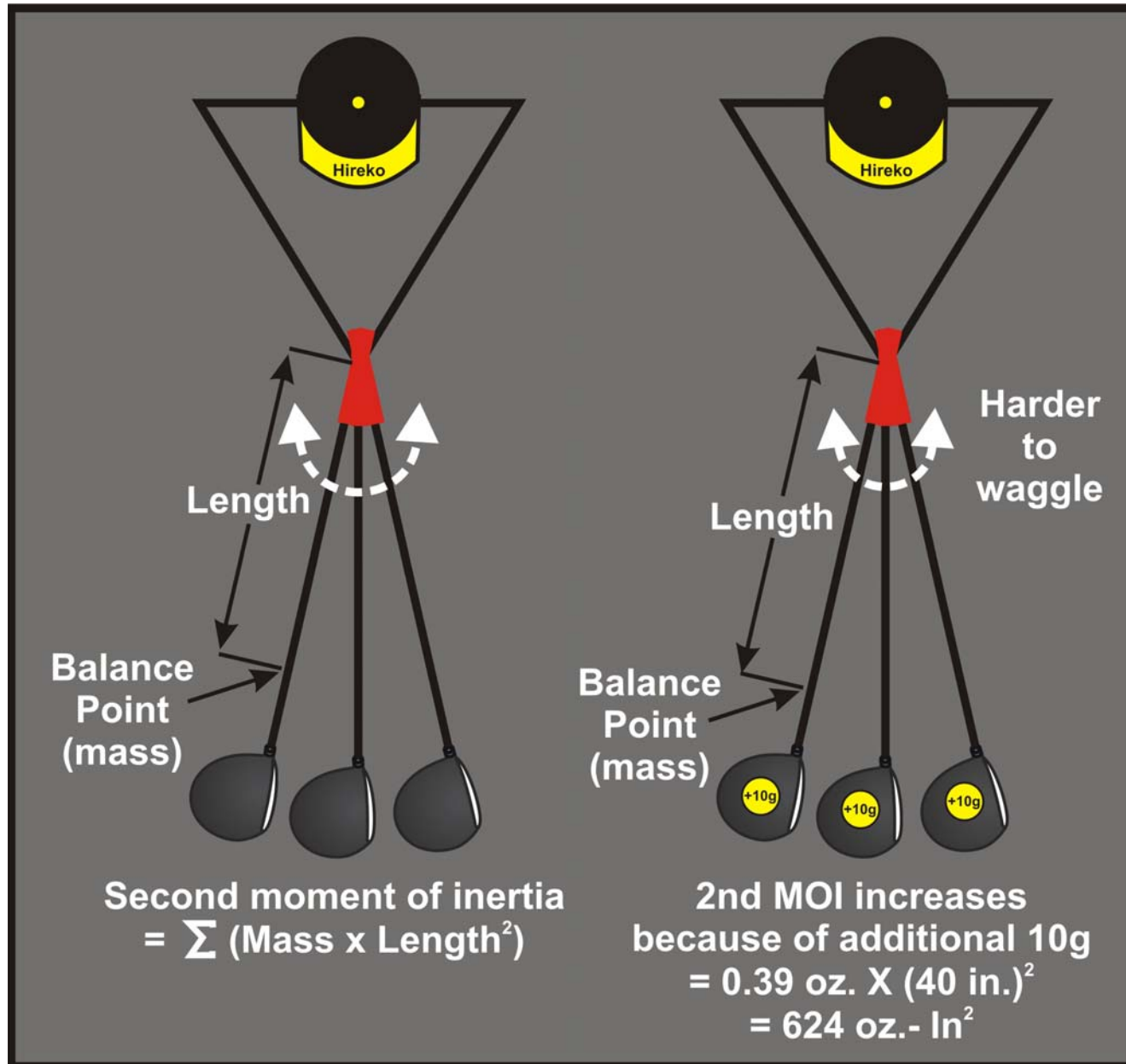
$$\text{Force} = \text{mass} \times \text{acceleration}$$

$$\text{acceleration} = \frac{\text{velocity}}{\text{time}}$$

Break Even Point

Head Mass	Velocity	Ball Speed	Ball Speed	Distance
Grams	Meters/sec	Meters/sec	Miles/hour	Yards
190	101.0	67.0	149	253
195	100.5	67.0	149	253
200	100.0	67.0	149	253
205	99.6	67.0	149	253
210	99.2	67.0	149	253

Second Moment of Inertia



Adding Mass to the Head

257g

267g

277g

Lead tape for testing swingweight
(but it takes a lot!)

3 HC

Handicap 3
Swingweight C6 01 06
Swingspeed 94.0 92.4 93.6
Time (sec) 0.9 0.9 0.9



6 HC

Handicap 6
Swingweight C6 01 06
Swingspeed 86.2 88.4 94.6
Time (sec) 0.96 0.94 1.08



7 HC

Handicap 7
Swingweight C6 01 06
Swingspeed 77.8 77.2 77.2
Time (sec) 1.0 1.0 1.0



11 HC

Handicap 11
Swingweight C6 01 06
Swingspeed 76.4 75.2 76.4
Time (sec) 1.2 1.2 1.18



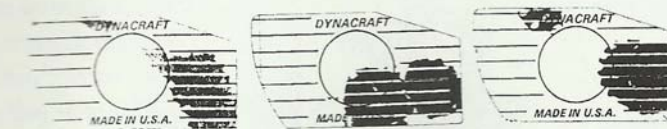
14 HC

Handicap 14
Swingweight C6 01 06
Swingspeed 65.8 66.6 64.4
Time (sec) 0.92 0.9 0.9



22 HC

Handicap 22
Swingweight C6 01 06
Swingspeed 70.2 68.6 69.2
Time (sec) 1.0 0.98 0.98

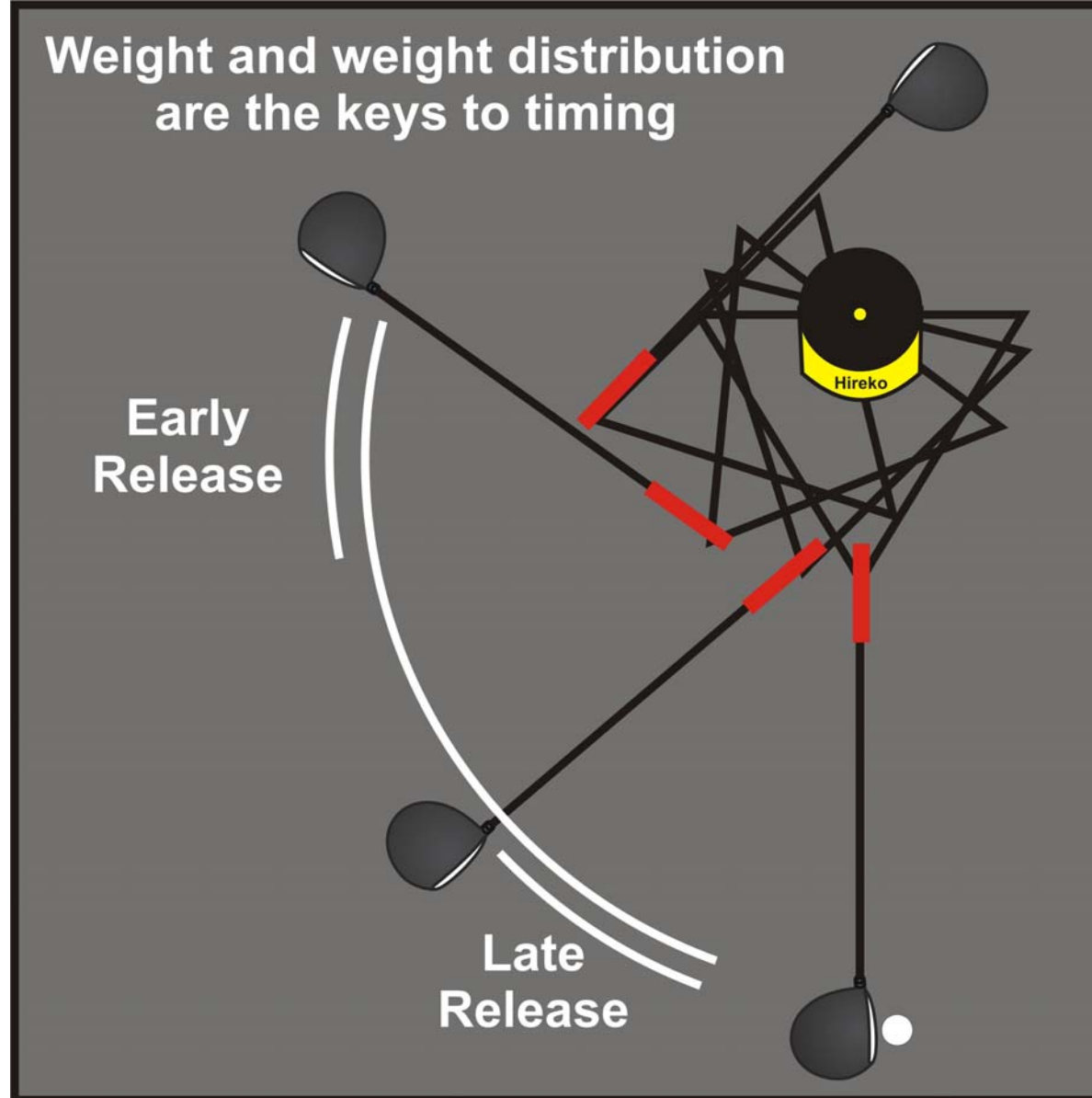


36 HC

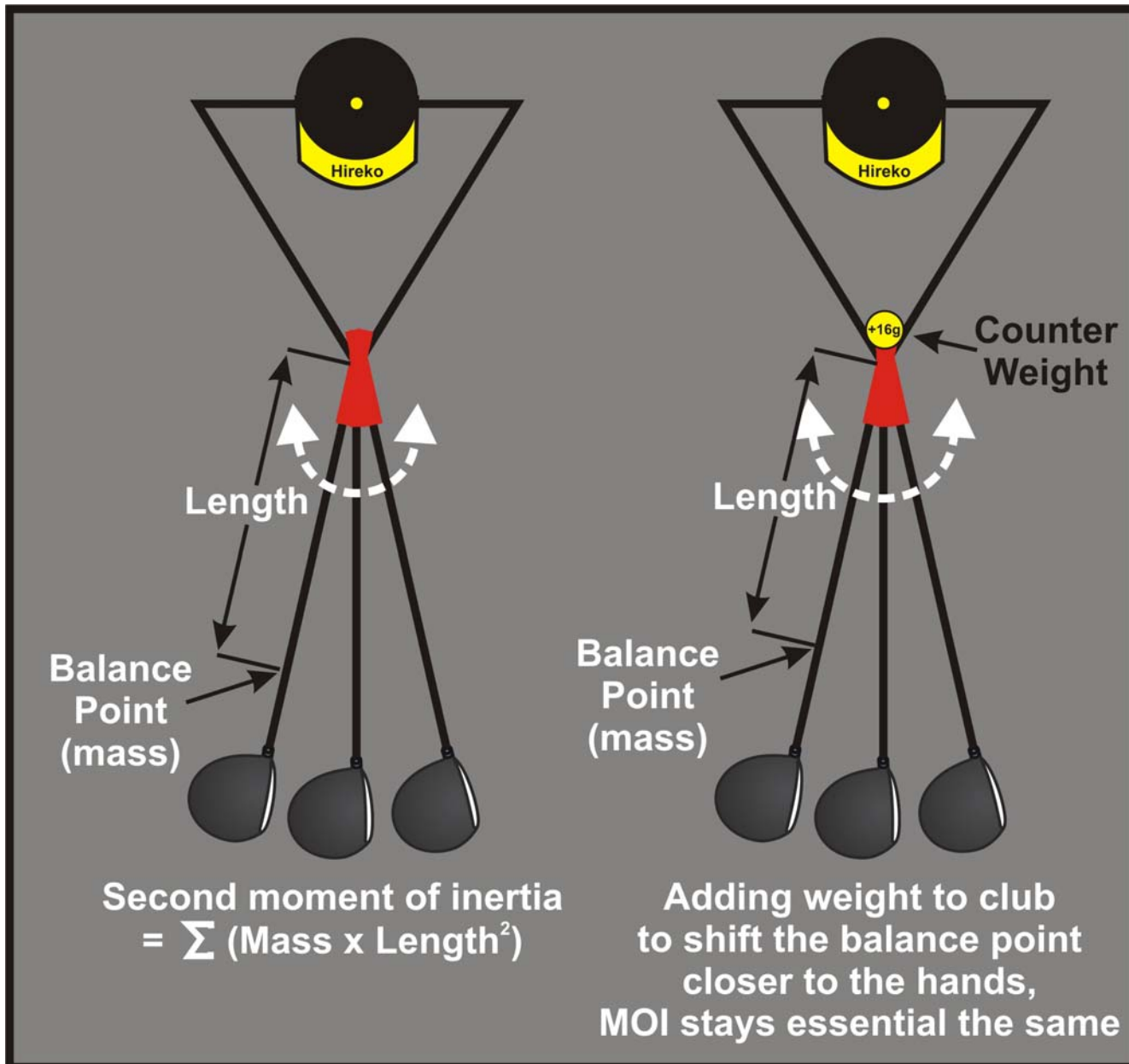
Handicap 36
Swingweight C6 01 06
Swingspeed 67.2 63.8 65.2
Time (sec) 1.08 1.1 1.1



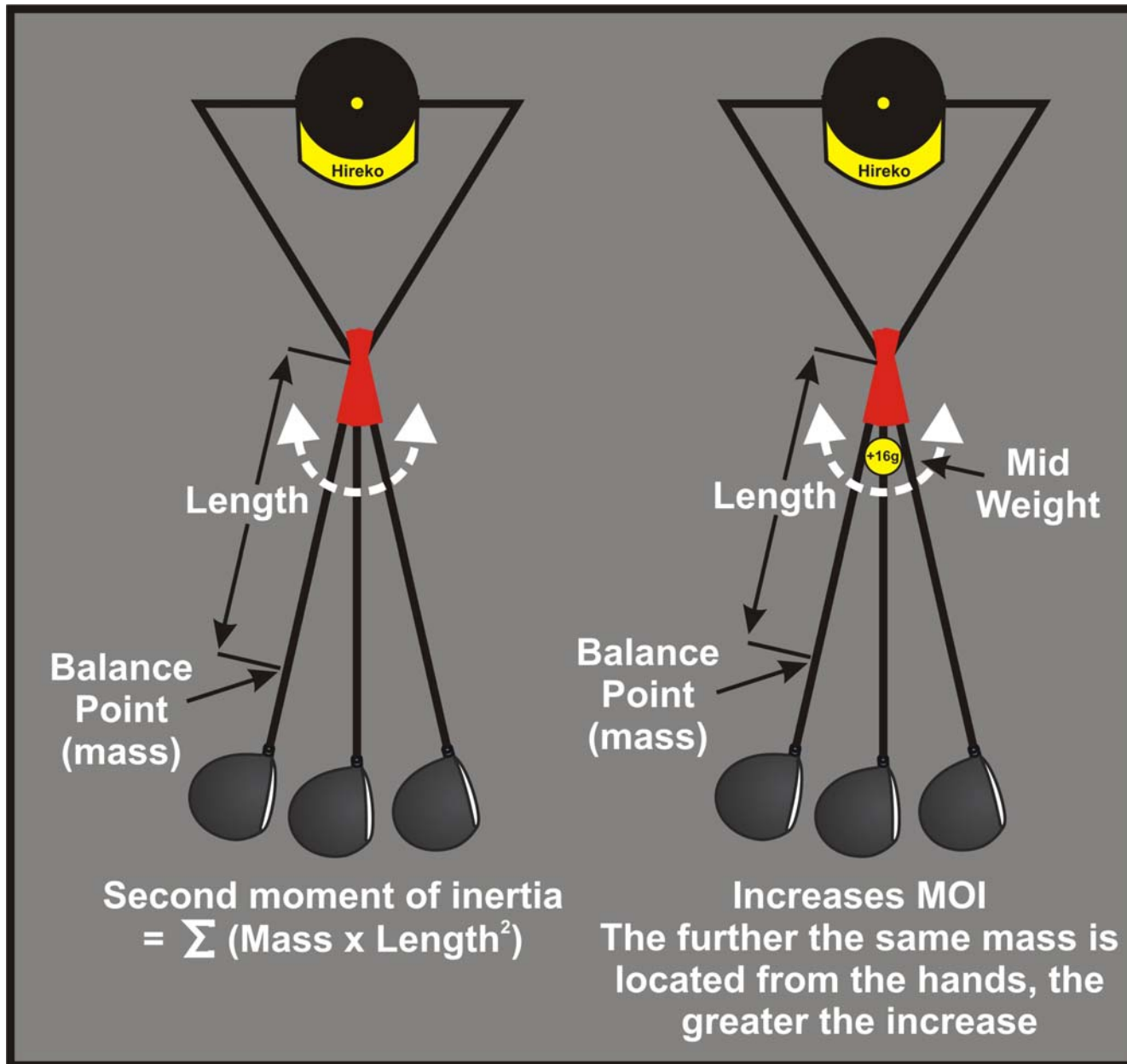
Releasing the Club



Counterweighting

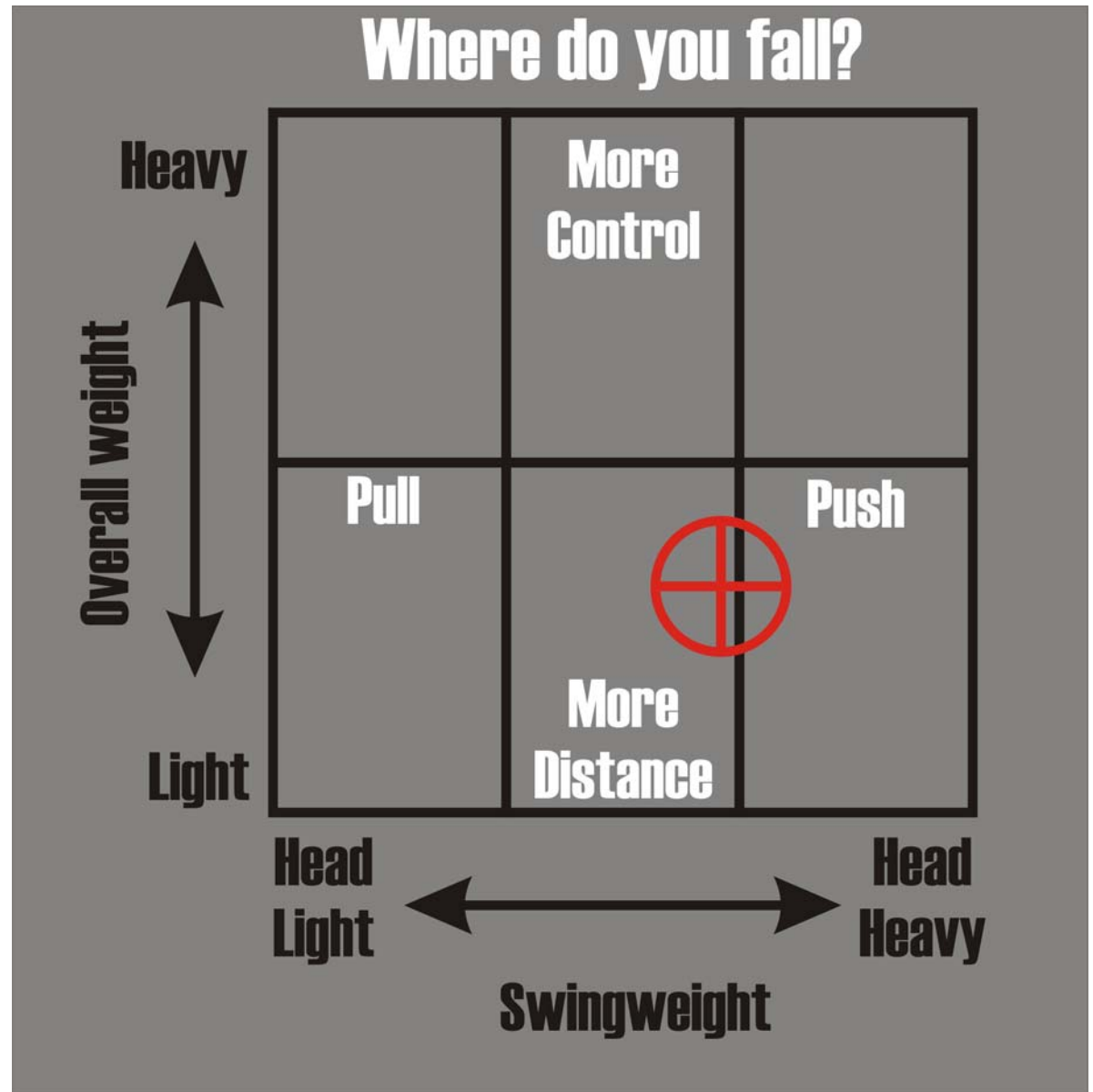


Mid Weight



“Weighing” Your Options

- Heavy / Head Heavy
- Heavy / Head Light
- Light / Head Heavy
- Light / Head Light
- Or somewhere in-between



Experimentation

Lead tape (or screws) – increase head heaviness



Mid weight – increases overall weight

Counterweight – decreases head heaviness





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A taped copy of the webinar will be available on
[Youtube.com/hirekogolf](https://www.youtube.com/hirekogolf) and
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