The 3-Peak Backstroke

2015 ASCA World Clinic
Cleveland, OH  USA

Ernie Maglischo
A forward velocity graph for former World Record Holder and Olympic Champion, Martin Lopez-Zubero. The graph shows one complete stroke cycle. It also demonstrates that he produces 3 propulsive peaks with each arm stroke. The photos along the top show Martin executing, what I call, the final upsweep with his right arm. The arrows indicate the approximate propulsive effect of his arm stroke at each point shown. The forward velocity graph was modified with permission from: J. Cappaert and B.S. Rushall. (1994). *Biomechanical Analyses of Champion Swimmers.* p. 2.06. San Diego, CA: Sports Science Associates. The photographs are courtesy of Martin Lopez-Zubero.
Final upsweep
Martin Zubero – Stroke Patterns

Figure 5.13. Martin Lopez-Zubero’s final upsweep of his 3-peak backstroke. The two photographs in this figure show Martin starting the final upsweep, in the photograph on the left, and near the point where he achieves peak propulsion from the upward motion of his arm in the photograph on the right. The graph and stroke pattern were modified with permission from: J. Cappaert & B. S. Rushall. (1994). Biomechanica Analyses of Champion Swimmers. P. 2.06. San Diego, CA: Sport Science Associates. The photographs are from the 1991 World Swimming Championships and provided courtesy of Martin Lopez-Zubero.
The release and exit of Martin Lopez-Zubero’s right arm stroke. The two photographs in this figure show Martin nearing completion of his final upsweep, in the photograph on the left and at the point where he his hand leaves the water in the photograph on the right. The graph and stroke pattern was modified with permission from: J.Cappaert &B.S. Rushall. (1994). *Biomechanica Analyses of Champion Swimmers*. P. 2.06. San Diego, CA: Sport Science Associates. The photographs are from the 1991 World Swimming Championships and made available courtesy of Martin Lopez-Zubero.
A propulsive force graph for Jesse Vassallo. The data for the graph were gathered during the 1984 USA Olympic Training Camp. Jesse was a member of the USA Olympic swimming team at the time. He was discovered to be using a unique style where he pulled with a nearly straight arm and gained his greatest amount of propulsive force from a long upward sweep of his arm near the end of his underwater arm stroke. These data were reprinted with permission from: Schleihauf, R.E., Higgins, J. Hinrichs, R., Luedtke, D., Maglischo, C.W., Maglischo, E.W., and Thayer, A. (1984). Biomechanics of swimming propulsion. In: T. Welsh, (Ed.). ASCA World Clinic Yearbook. pp. 19-24. Fort Lauderdale, FL: American Swimming Coaches Association.
Elite backstroke swimmers who may be using a three-peak arm stroke

Missy Franklin

Matt Grevers

Ryan Lochte

Aaron Piersol
Lea Loveless Maurer’s back crawl stroke. Lea appears to be using an inward scull at the end of her arm stroke, as she sweeps her right arm in and up toward the surface. Note, her right arm is straight and sweeping across the water and up at this time. This photo was made by the author from YouTube video of Lea in competition and used with her permission.
Olympic Champion and World Record Holder, Natalie Coughlin use a modified 6-beat kick with what may be a 3-peak backstroke. The use of these photographs are from in competition YouTube video footage and printed with Natalie’s permission.
Possible advantages of a 3-peak backstroke

1. Stroke rate will increase and stroke length may also increase.
2. Average velocity per stroke cycle is likely to be greater.
3. Swimmers are likely to decelerate less between arm strokes.

Possible advantages of a three-peak backstroke.
# Greater Average Velocity per stroke:

Table 1. Peak velocity during different stroke phases for 3 elite backstroke swimmers

<table>
<thead>
<tr>
<th>Name</th>
<th>Final Upsweep</th>
<th>Upsweep</th>
<th>Downsweep</th>
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</thead>
<tbody>
<tr>
<td>Jeff Rouse</td>
<td>&gt;2.0 m/sec</td>
<td>1.7 m/sec</td>
<td>1.6 m/sec</td>
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<tr>
<td>Martin Zubero</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right</td>
<td>1.9 m/sec</td>
<td>1.8 m/sec</td>
<td>1.7 m/sec</td>
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<tr>
<td>Left</td>
<td>2.3 m/sec</td>
<td>1.7 m/sec</td>
<td>1.6 m/sec</td>
</tr>
<tr>
<td>Kristina Egerszegi</td>
<td>2.52 m/sec</td>
<td>1.7 m/sec</td>
<td>2.0 m/sec</td>
</tr>
</tbody>
</table>

Traditional and 3-peak backstrokes
Deceleration time between strokes

.50 secs

.30 secs
# Faster Turnover

Table 2. Stroke rates (strokes/min) for elite swimmers in 100 and 200 m backstroke events between 1976 and 1998

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<tbody>
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<td>100m Bk</td>
<td>46</td>
<td>48</td>
<td>50-56</td>
<td>46</td>
<td>47</td>
<td>48-53</td>
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<tr>
<td>200m Bk</td>
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