DIVING

Generation of angular momentum

for a backward ("reverse") somersault:

\[ F = \text{torque} \]

for a forward somersault:

\[ F = \text{torque} \]
Actions in the air

small moment of inertia $\rightarrow$ large angular velocity

large moment of inertia $\rightarrow$ small angular velocity
Angular momentum is a vector:

- If angular momentum vector points away from you, you see clockwise rotation.
- If angular momentum vector points toward you, you see counterclockwise rotation.
- If angular momentum vector points neither toward nor away from you, you see no rotation.
**Combined twisting and somersaulting**

Let’s see a motion that starts as a pure backward somersault.

Then the diver lowers the right arm ...

“the” plane = plane perpendicular to the angular momentum vector

The longitudinal axis of the diver is now off the plane:
We now have a somersault rotation and a twist rotation.

Effect of $H_{SOM}$: double-conical somersault
effect of $H_{TW}$: twist rotation

view along longitudinal axis: twist angular momentum vector points away from us, so we see clockwise rotation
To stop the twist rotation: Need to get longitudinal axis back into the plane.

One option:

Get back into the plane after a whole number of twist rotations (1.0, or 2.0, or 3.0 twist rotations):

![Diagram showing somersaulting + twisting and pure somersaulting](image)

Problem: In a backward somersault it is difficult to judge the time of entry into the water.

This makes it impossible to make last-instant corrections → excessive splash.
It would be advantageous to get back into the plane after 1.5, 2.5 or 3.5 twists (instead of 1.0, 2.0 or 3.0). That way the somersault rotation would be a forward somersault (“face-first”).

This requires a readjustment of the arms right after producing the tilt:

right arm sneaks back up; left arm sneaks down
Then get back into the plane after a number of twists-and-a-half (1.5, or 2.5, or 3.5 twist rotations): 

after 1.5 (or 2.5 or 3.5) twists

somersaulting + twisting

pure somersaulting
... face-first!