The how and Why by George Rackham

I have been asked if I could present the principles of mechanics applicable to diving as described in "Diving Complete", in a condensed form for easy reference.

The important conclusions reached are :

1. That the angular momentum (rotational energy) responsible for producing the somersaulting motion during the flight of a dive, must originate during the take-off.
2. That no movement of any part of the body made during the flight can start the body rotating (somersaulting).
3. That a somersault, once started, cannot be stopped by any action made by the diver during the flight of the dive. It can be only slowered.
4. That the amount of angular momentum imparted to the body during the take-off depended mainly on the speed at which the upper body (head, arms and shoulders) was moving in the required direction of rotation, at the moment the feet left the board.
5. That the required upper body movement can be obtained in the simple forward and back dives by over-balancing or leaning.
6. That a greater effect and a more efficient method is achieved by jerking' the upper body in the required direction of rotation (momentum transfer). Used to great advantage in back and reverse dives.
7. That a third method, eccentric leg thrust (hips bent) can be used in any forward rotating dive (forward and inward groups), and can be used at all stages in the teaching of the Plain Header.
8. The rate of rotation (angular velocity) of a somersaulting diver can be increased by making the body more compact, or decreased by making it less compact.
9. When the body is fully stretched, its resistance' or rotational inertia (moment of inertia) is at its greatest, and its angular velocity is at its lowest.
10. When the body is in a tight compact tuck position, its resistance' to rotation is at its lowest, and its angular velocity is at its greatest (about four times as great).
11. The total somersaulting energy (angular momentum) remains constant, irrespective of any change in the body position during the flight.
12. The angular momentum (rotational energy) is a product of the moment of inertia (rotational resistance) and the angular velocity (rate of rotation).
13. For the angular momentum to remain constant, any increase in the moment of inertia will result in a corresponding decrease in the angular velocity and vice-versa.
14. Whilst the body position is altering, the rate of rotation is changing. When the body position remains unchanged, the rate of rotation remains constant.
15. The greater the range of body movement during the flight, the greater the amount of control there will be over the rate of rotation.

After having experience at teaching and coaching dives from the Forward Group, you will arrive at the following conclusions :

1. That the most important part of the dive was the take-off.
2. That excessive lean during the take-off was the greatest retarding factor to progress in diving.

3. That, whilst recognizing that it was possible to employ lean (over-balancing) to create rotation from the 5 or 10 metre platforms, it was impractical to use this technique from the modern flexible springboards.
4. That a better and more efficient means of creating rotation was provided by the more efficient eccentric leg thrusts (hips bent) method.
5. That this method reduced the angle of lean to the minimum necessary to provide enough forward travel to clear the board, whilst at the same time giving maximum height at the take off.
6. That it was advisable for divers to be made aware of this method and to be taught it during the very early stages of instruction.
7. That a further method of creating rotation was achieved by the use of transfer of momentum (jerk).
8. That when both of these techniques were employed together, the maximum amount of rotation could be created with the minimum loss of height