

## Gymnastics Assignment

**Construct and rationalise a coaching methodology for developing and performing:**

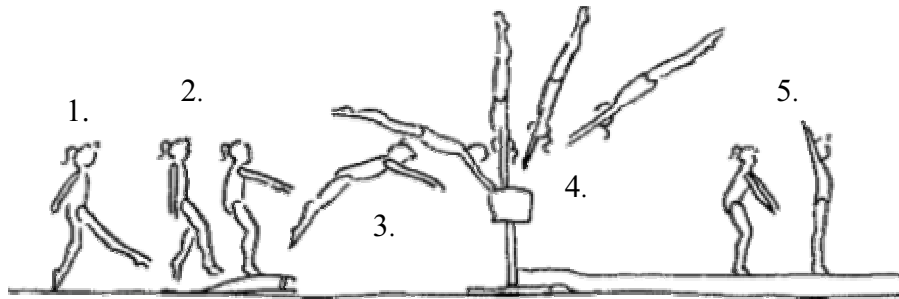
**a) Front Somersault Tucked**

**b) Handspring Vault**

Gymnastics is a sport that been around since before the first set of Olympics. The early Romans and Greeks practiced forms of Gymnastics to obtain flexibility and physical fitness. The physics of Gymnastics are dependent on the manoeuvres being performed and the person who is performing.

The handspring remains one of the most common upper level vaulting families. Coaches should recognise the benefits of a strong handspring in relation to all conventional approach vaults. Time well spent on the perfection of a handspring will in time lead to quality upper level vaulting success.

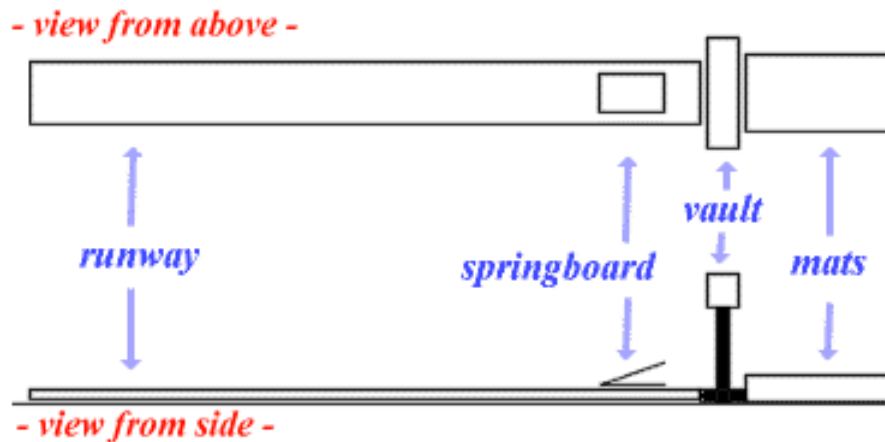
In shape it is relatively simple to understand since the gymnast remains arched during most of the vault. It relies upon the gymnast making a run-up with enough speed to maintain a long shape during rotation. Needless to say both the run and the jump must be well performed. This vault can be broken down into five general phases with each one playing an important role in the outcome, diagram shown below:



Following a short run and a hop, which brings the gymnast into the appropriate position, the gymnast performs a handspring by rotating through a handstand into the air and over to land in a standing position. The hopping movement that leads into the handspring, is made with the body inclined forward and the non-hopping leg extended behind. Then, when the hopping foot lands slightly behind the gymnast's centre of gravity, the body is in a position to enable it to rotate forward without delay. As the body begins this forward rotation, the gymnast brings the non-hopping foot forward and places it on the floor in front of the other one. A simultaneous lowering of the arms and trunk, together with a thrust from the rear leg, moves the centre of gravity forward, over, and beyond the front foot.

The angular momentum that has already developed is added to by the strong upward swing of the rear leg and by the moment of the weight about a horizontal axis through the ankle of the front leg. As the gymnast reaches forward and places the hands on the floor, a forceful extension of the front leg substantially increases the angular momentum of the body and carries it upward toward the handstand position. Assuming that the gymnast has now acquired all the angular momentum needed, the next task is to develop the necessary

lift to project the gymnast upward into the flight phase of the handspring. To do this, the gymnast contracts the appropriate muscles of the arms and shoulders, and thrusts forcefully downward against the floor, as the centre of gravity passes forward and over the hands. (Hay, 1993)



(<http://www.angelfire.com/sc2/physics212/intro.htm> – 3/5/2004)

Shown below are the five general phases of the handspring vault. Phase 1: The Run - Coaches have had the importance of running stressed to them since advanced vaulting began, yet generally this is the area that is many times overlooked in training. As mentioned previously, generally the gymnast that runs faster and more efficiently will gain better results. Time spent in this phase will reap results regardless of how monotonous it may seem.

Phase 2: The Hurdle - In order to maximise the speed to the horse it is important to keep the hurdle trajectory moving forward. If one were to draw a dot on the athlete's centre of gravity and watch it throughout the hurdle, it should continue moving forward. Unnecessary up and down movement is inefficient and diminishes the effectiveness of a good run.

During the hurdle the arms should be swinging downward, forward and then upward to gain a powerful "lifting" action off the board. Upon board contact, the feet will be slightly in front of the centre of gravity, hip angle open, entire body tight and buttocks tucked under.

Phase 3: Pre-flight - The main objective of the run, hurdle and pre-flight is to establish force and rotation that, in turn, transfer into vertical lift and airtime off the horse. The objective of pre-flight on a handspring is to establish massive rotation by powerfully inverting the body.

Drills:

- Underarm Swing Rebound on the floor. If an athlete can generate good lift off the floor then she certainly will have the ability to use a springboard.
- Underarm Swing Rebound on a vault board. The punch of the board is quick and powerful. Emphasis should be on obtaining a strong vertical lift while achieving a tight body in the air. Rebound and then land back on the board.

- Rebound onto elevated surfaces. As the athlete becomes more proficient simply raise the height of the landing area.
- Plyometric Training. Increasing the jumping ability of the athlete correlates well with the ability to vault.

Phase 4: Repulsion - Repulsion is the skill of transferring the established focus into vertical lift. As the body leaves the board, it should be passing from a tight hollow position to an extended position upon contact with the horse. With perfect timing, the arms continue to push through the horse (popping action) and the chest returns from the extended (slight arch) position back to a hollow (chest in). All of this is happening in tenths of a second, which makes mechanics of vital importance.

Drills:

- Handstand pops. From a long lunge, swing the arms downward and then forward to make contact with the floor while inverting to a handstand. Powerfully explode through the shoulders in an attempt to rise off the floor. After popping off the floor the gymnast can either land back on the hands, rotate to the back (onto a soft surface), or forward roll out of it.
- Handstand pops onto elevated surface.
- Horizontal pops from a long lunge. Swing the arms downward and forward into a stationary object (a wall, the horse, etc.) while lifting your body to horizontal. Contact the surface with a blocking action, rebound from it and land on stomach on a skill cushion.
- Trampoline bounces. Bounce on your hands on the trampoline.

Phase 5: Afterflight and Landing - As the body rises after the repulsion phase, emphasis remains on maintaining a tight hollow position with the arms squeezing to the side of the head. In preparation for landing, it is helpful for the athlete to "SEE" something, but because we do not want them to drop their head out of line with the body, looking for the floor is not an option. Many coaches suggest spotting the wall.

As the body contacts the floor the force is absorbed by bending the knees. The arms at this point drop from overhead, downward, sideways and then forward in order to assist with the balance. Coaches should be aware that although landings are certainly important, emphasis at the beginner levels should be on establishing speed, power, lift, distance, etc. Placing emphasis on "sticking the landing" early in the development encourages the gymnast to "back off" on the desired attributes so that they can control the landing.

Drills:

- Invert to handstand. On the floor, execute a hurdle and punch. Upon leaving the floor, and with assistance from a spotter, invert to a handstand on an elevated surface. The more accomplished the athlete the higher the surface. Eventually assistance will not be necessary.
- From a vault board, execute the same drill.

- 3/4 layout front salto. Using a soft elevated surface (resi pit, stacked mats, etc.) execute a run, hurdle punch, and a 3/4 layout front salto with assistance of a spotter. The athlete will land flat on her back. The body should remain tense throughout the salto. The arms lift from the board, rotation is established, the arms can either remain overhead or, to facilitate greater rotation, the arms can fold into the body.
- Layout front saltos, feet to feet.
- Layout front saltos onto elevated surface. Emphasis should be on quick, tight rotation.
- Layout 1 1/4 onto a soft surface. Rotate all the way to the stomach with the assistance of a spotter. This is an advanced drill and should only be used with accomplished gymnasts.  
(Geddert, 1998)

The forward somersault, a tightly tucked forward roll performed while the gymnast is in the air, is normally preceded by a short run and a hurdle step. When the feet contact the floor at the end of this hurdle step, the gymnast cushions the shock of their landing by bending slightly at hip, knee, and ankle joints. This action also places these joints in positions from which, moments later, they can be extended to drive the body upward into the air. The reaction to this extension of the legs acts in an upward and backward direction and passes behind the gymnast's centre of gravity. Thus, the reaction accounts not only for the lift that the gymnast obtains but also for the greater proportion of the subsequent angular momentum. The latter may be added to by a forward and downward movement of the arms from a position overhead or by an upward and backward swing of the elbows from a position in front of the body. Once off the floor, the gymnast quickly moves into a tucked position, thereby decreasing the moment of inertia and speeding the rotation. Then, towards the end of the flight, the gymnast comes out of the tuck, slows the rotation, and prepares to land in an erect standing position.

A biomechanical analysis of gymnasts executing the front somersault tucked show the following characteristics:

- A large horizontal displacement of the centre of gravity during the pre-flight (or hurdle) phase
- A touchdown position (following the pre-flight phase) in which the trunk was near vertical, the upper arms were beside or behind the trunk, and the ankles were slightly plantar-flexed.
- A low-point position (that is, the position where the centre of gravity has reached its lowest point) in which the upper arms were behind the trunk, the knees were minimally flexed, and the lower legs were slightly forward of the vertical.
- A takeoff position in which the upper arms were up to 60-70 degrees behind the trunk.
- A high flight path
- A landing with the centre of gravity high above the floor at the instant of touchdown.  
(Hay, 1993)



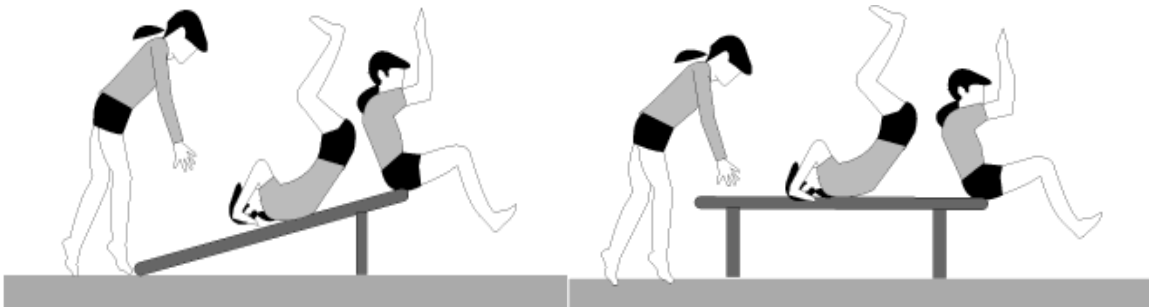
The Somersault Technique.

When novice gymnasts practice the somersault technique it is best for them to roll upwards. Rolling upward on an angled mat or tumbling table will make it easier to learn to somersault. When you're teaching somersaults, your students will have greater success if they roll up an incline. This is the opposite of what most people would think. For example, your students, if given a choice, would probably attempt to roll down, not up.

When rolling upward, the head need not rotate as much, and the hips don't have as far to fall to meet the ground. Also, it's easier for your students to stand up at the end of the roll since they're already in a semi-erect position.

Progression - Once your students have mastered the upward roll, have them practice on a ground-level mat. You could also have them try a surface that is elevated, but level. This gives the feeling of performing an aerial somersault, since your students begin the movement in a standing position, perform the somersault, then return to a standing position.

Equipment - Tumbling tables or incline mats are ideal for performing uphill somersaults. However, if you don't have this specialised equipment, try placing a mat onto other folding mats to produce an uphill grade. You might even be able to use the top portion of a box horse, and prop it up on one side. Be sure you use two spotters, however, because the surface is very narrow.



[http://www.eun.org/vs/physedu/lesson\\_word/gymnastics\\_somersault.html](http://www.eun.org/vs/physedu/lesson_word/gymnastics_somersault.html) – 5/5/2004)

Gymnastics requires many attributes such as strength, suppleness, co-ordination, stamina balance, flexibility and rhythm. Fitness in Gymnastics is often called conditioning and is divided into more specific types of work, each of which will improve some aspect of the physical condition of the body.

Stretching – This will improve the gymnast's ability to perform skills and as with the dancer, will allow them to create more shapes and lines.

Strength – This is made up of separate types of activity. The first is structure building, which exercises lightly, but often, the entire muscular frame of the body. Indeed, gymnastics exercises the parts that other sports cannot reach. The second category covers pure strength activities, which we all understand will give us the ability to lift heavier weights, chin a bar or kick a ball further. Muscular endurance, the third category, allows us to make more chin-ups or press-ups without feeling tired. The fourth category, that of dynamic power, is very important in gymnastics as many movements are performed at speed. The gymnast must exercise to have the explosive and accurate needed during complex routines.

Stamina – This is something, which we usually relate to running games and sports. Stamina is vital to the gymnast during floor exercises when the lungs have to work very hard to keep the oxygenated blood flowing to feed the energy system which helps keep the muscles working. Training for gymnastics as for any sport will require stamina fitness.

(Low, 1990)

## **References:**

- Geddert, 1998, <http://www.usa-gymnastics.org/publications/usa-gymnastics/1998/2/coaching-corner.html> - 5/5/2004
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