

Factors Affecting Stability

14-1

- The ability to maintain one's balance under unfavorable circumstances is recognized as one of the basic motor skills.
- Understanding the factors affecting the stability of a performer's equilibrium state:
 - ▣ should make analysis of a balance problem easier.
 - ▣ may suggest means for skill improvement.

Factors Affecting Stability

- Three primary factors:
 1. Size of the base of support.
 2. Relation of the line of gravity to the base of support.
 3. Height of the center of gravity

Size of the Base of Support

- C of G must remain within the base of support in order to maintain equilibrium.
- Easier with larger base of support.

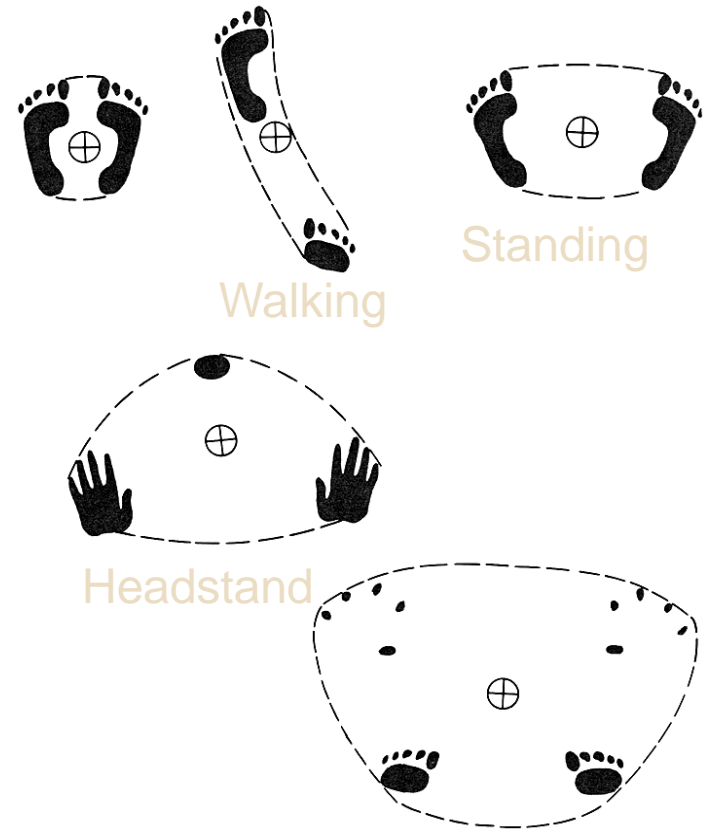


Fig 14.6

Shape of the Base of Support

14-4



Fig 14.6c

Resistance to
AP forces

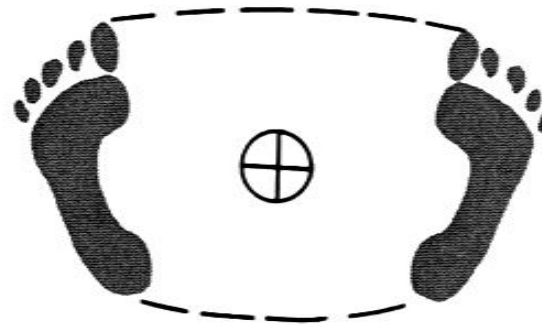


Fig 14.6b

Resistance to
lateral forces

Height of the Center of Gravity

14-5

- Height of C of G changes with body position.
- As C of G moves closer to base of support more angular displacement can occur before it goes beyond the base of support.

$a > b > c$ with
respect to
stability

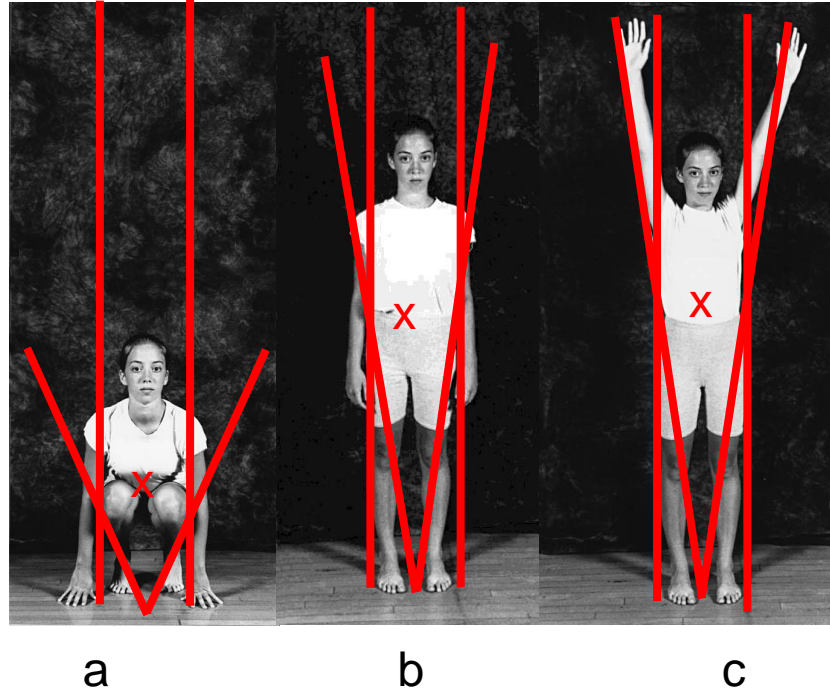


Fig 14.8

Relationship of the Line of Gravity to the Base of Support

14-6

to the Base of Support

- To maintain equilibrium, line of gravity must remain within the base of support
- Notice the hyper-extended the trunk to maintain the line of gravity within the base of support in Fig 14.10

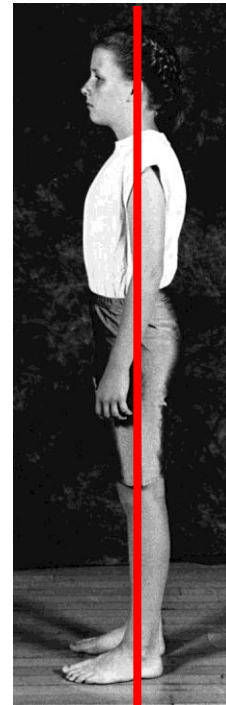


Fig 14.9

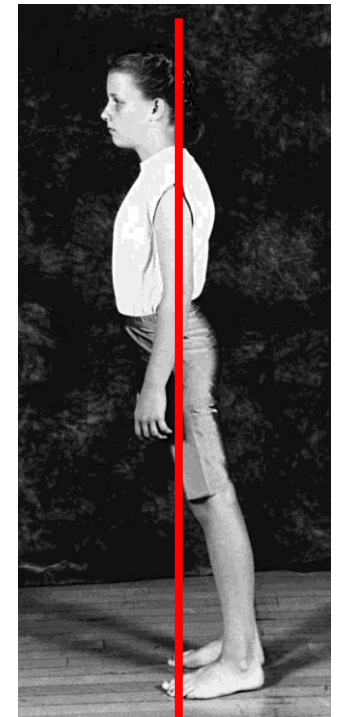


Fig 14.10

Mass of the Body

14-7

- Only a factor when motion or an external force is involved.
- Amount of force needed to effect a change in motion is proportional to the mass being moved.
- The greater the mass, the greater the stability.

Friction

14-8

- Friction is related to the size of the base of support.
- It has greater influence when body is in motion or being acted on by an external force.
- Inadequate friction makes it more difficult to maintain equilibrium.

Principles of Stability:

14-9

- I. Other things being equal, the lower the C of G, the greater will be the body's stability.
- II. Greater stability is obtained if the base of support is widened in the direction of the line of force.
- III. For maximum stability the line of gravity should intersect the base of support at a point that will allow the greatest range of movement within the area of the base in the direction of the forces causing motion.
- IV. Other things being equal, the greater the mass of a body, the greater will be its stability.

Principles of Stability:

14-10

- v. Other things being equal, the most stable position of a vertical segmented body is one in which the C of G of each weight-bearing segments lies in a vertical line centered over the base of support.
- vi. Other things being equal, the greater the friction between the supporting surface and the parts of the body in contact with it, the more stable the body will be.
- vii. Other things being equal, a person has better balance in locomotion under difficult circumstances when the vision is focused on stationary objects rather than on disturbing stimuli.

Principles of Stability:

14-11

- VIII. There is a positive relationship between one's physical and emotional state and the ability to maintain balance under difficult circumstances.
- IX. Regaining equilibrium is based on the same principles as maintaining it.

Mobility

14-12

- Mobility & stability have an inverse relationship.
- A critical point is the change from a position of stability to a state of mobility & vice versa.
- To initiate a step, line of gravity must be shifted forward of the base of support. The swing leg then moves forward to re-establish a base of support.

Mobility

14-13

- Often in sport, it is necessary to alter stability intentionally to become mobile.
- Ability to start, stop, or change direction quickly depends on manipulating the stability of the body.

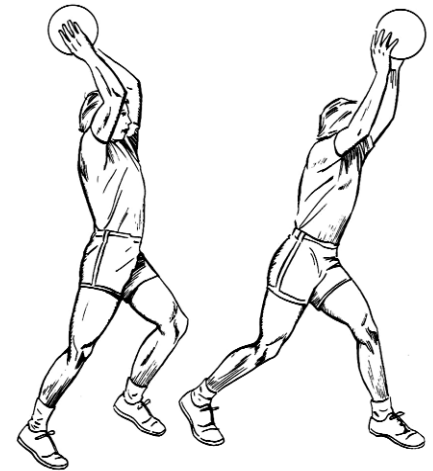


Fig 14.14