Jumps – Overlapping Action

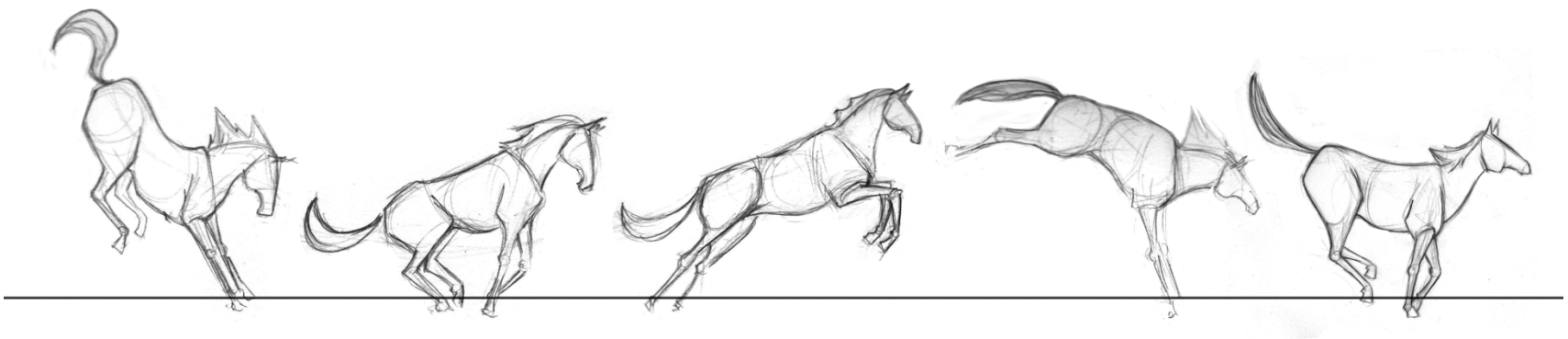
Overlapping Action

Overlapping action is any secondary motion that occurs in addition to the primary motion.

In this example the primary motion is the jump itself. Motion of the arms and head are active secondary motions, created by the character, while the drag of the clothing, hair, etc. are passive secondary motions.

Timing of Overlapping Actions

Overlapping actions may or may not have timing that matches that of the primary motion.



Passive overlapping actions, like follow-through and drag, are likely to be synchronized with the primary motion. Active overlapping actions may also be synchronized, especially if they are in support of the primary motion.

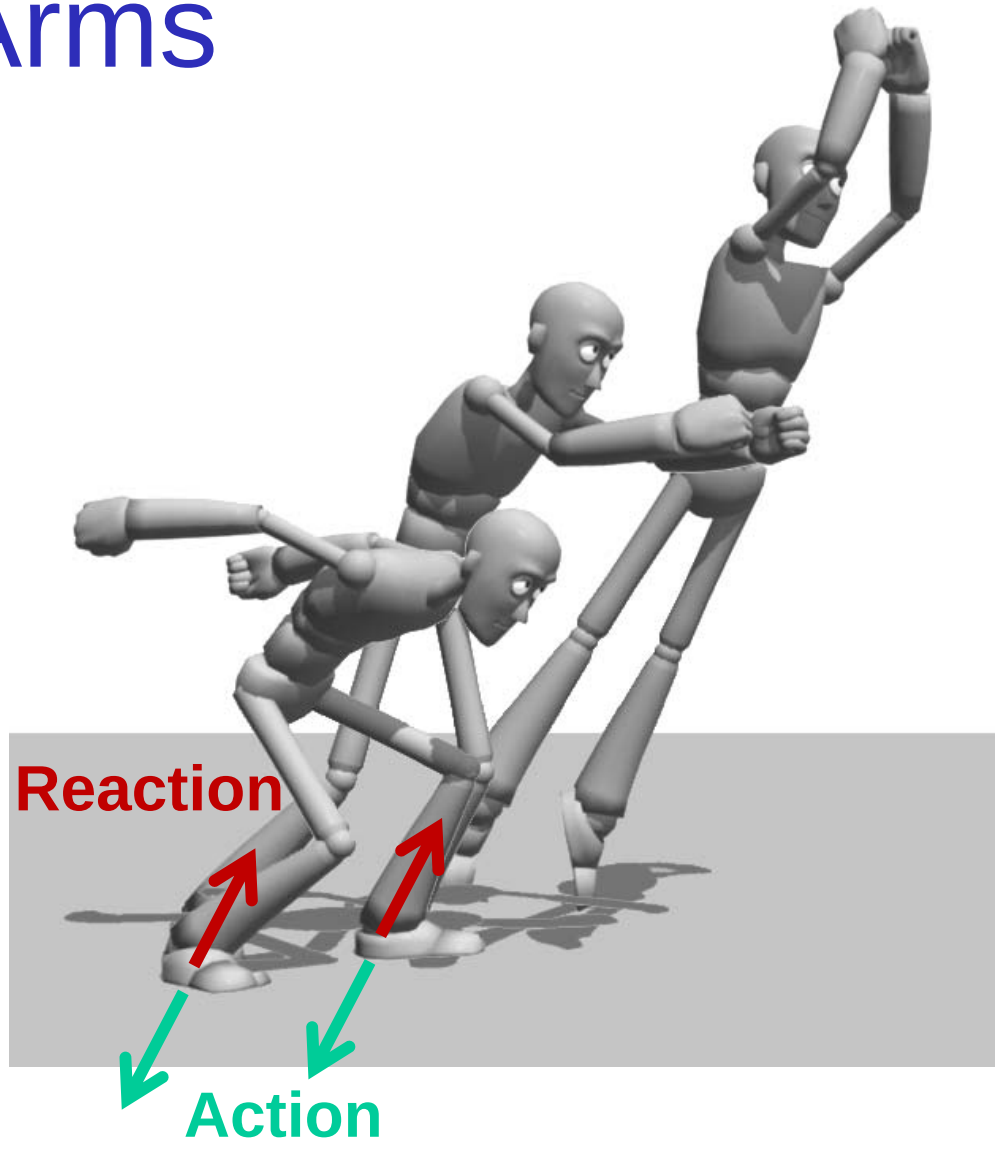
Swinging the Arms in a Jump

The height of a jump is significantly higher (almost 30% higher) if you swing your arms during the take-off portion of a jump.

Swinging the Arms

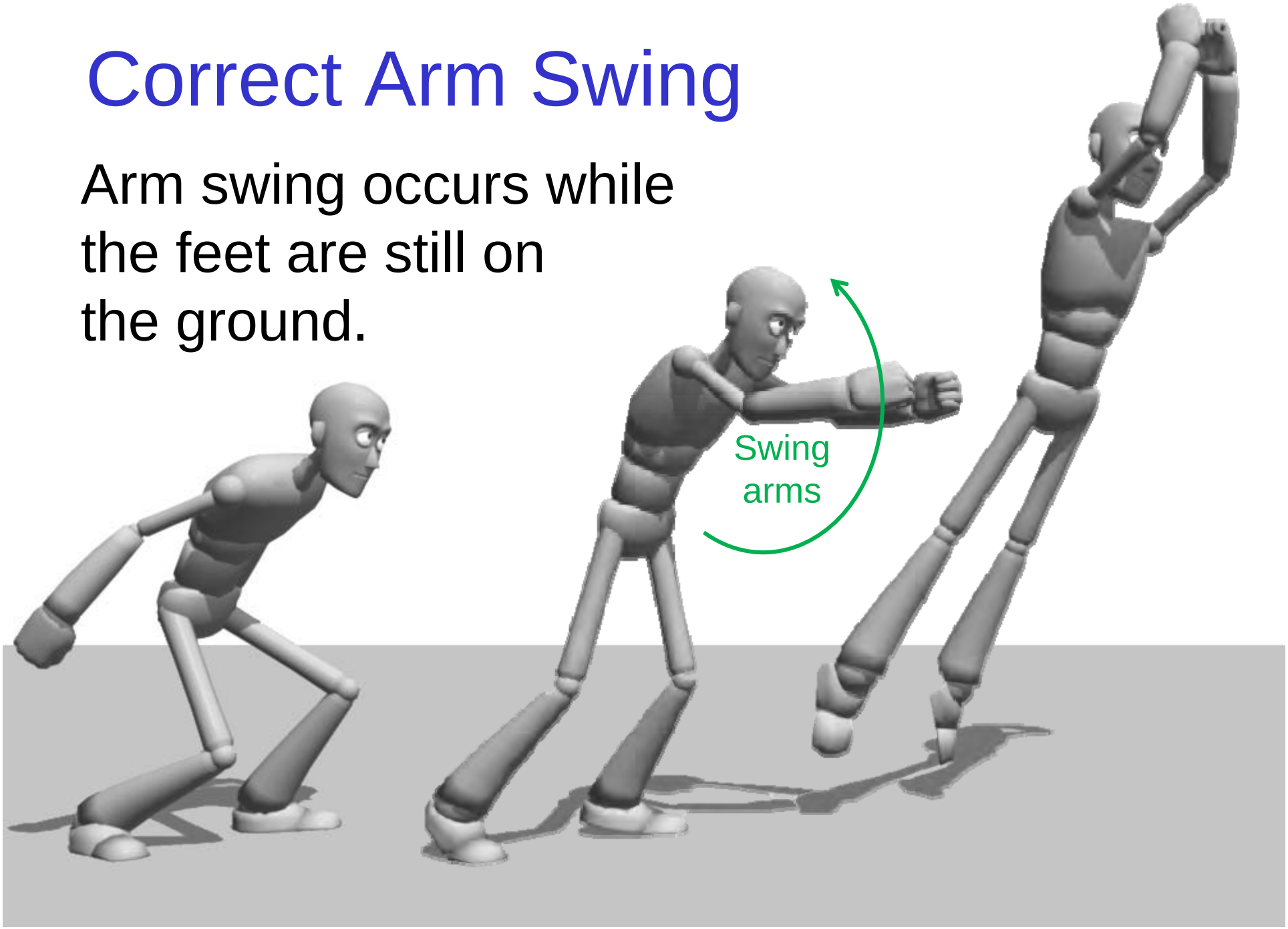
Swinging the arms has two related effects:

- The action force on the ground increases.
- The center of gravity is higher at take-off.



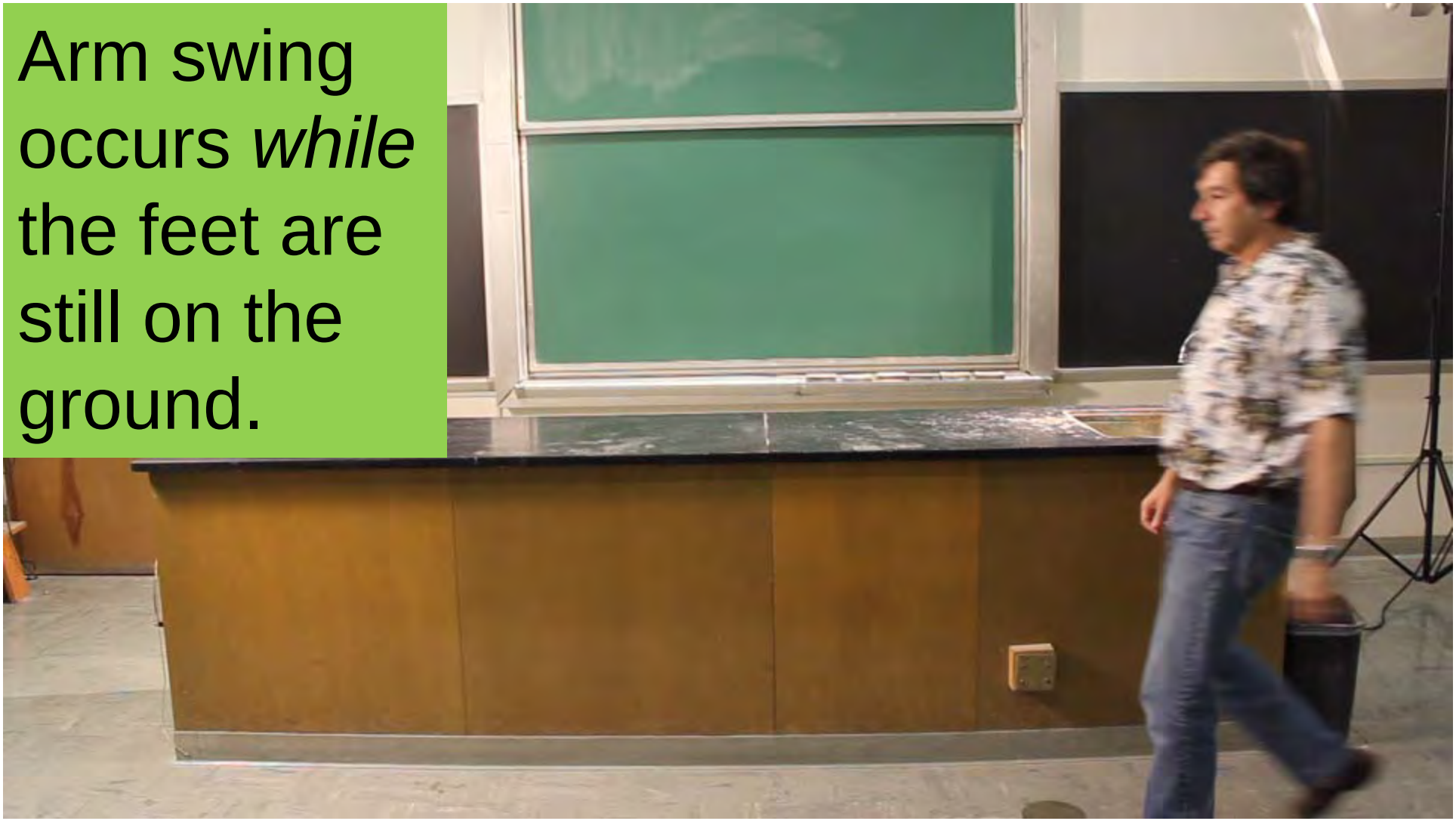
Correct Arm Swing

Arm swing occurs while the feet are still on the ground.



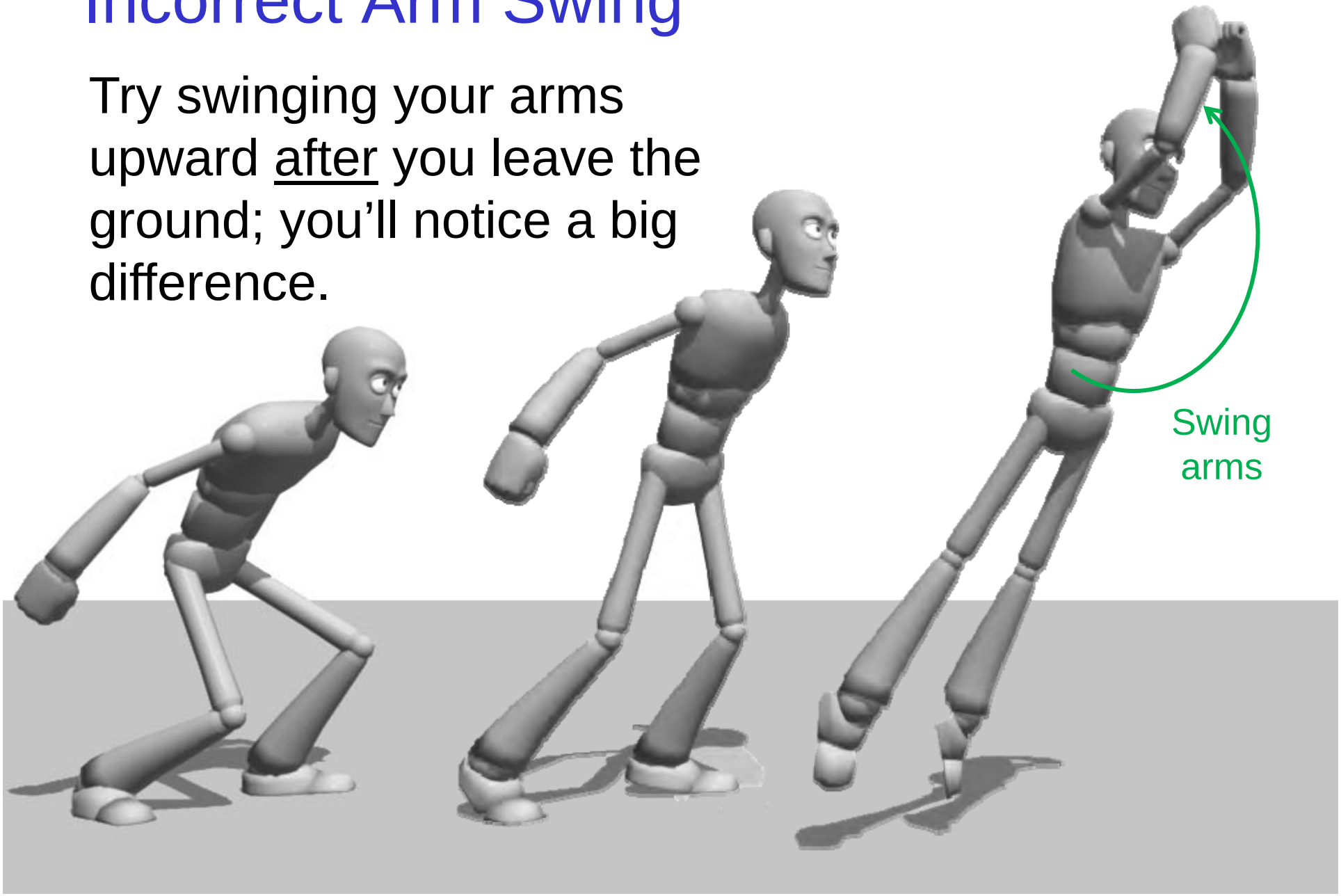
Correct Arm Swing

Arm swing occurs *while* the feet are still on the ground.



Incorrect Arm Swing

Try swinging your arms upward <u>after</u> you leave the ground; you'll notice a big difference.

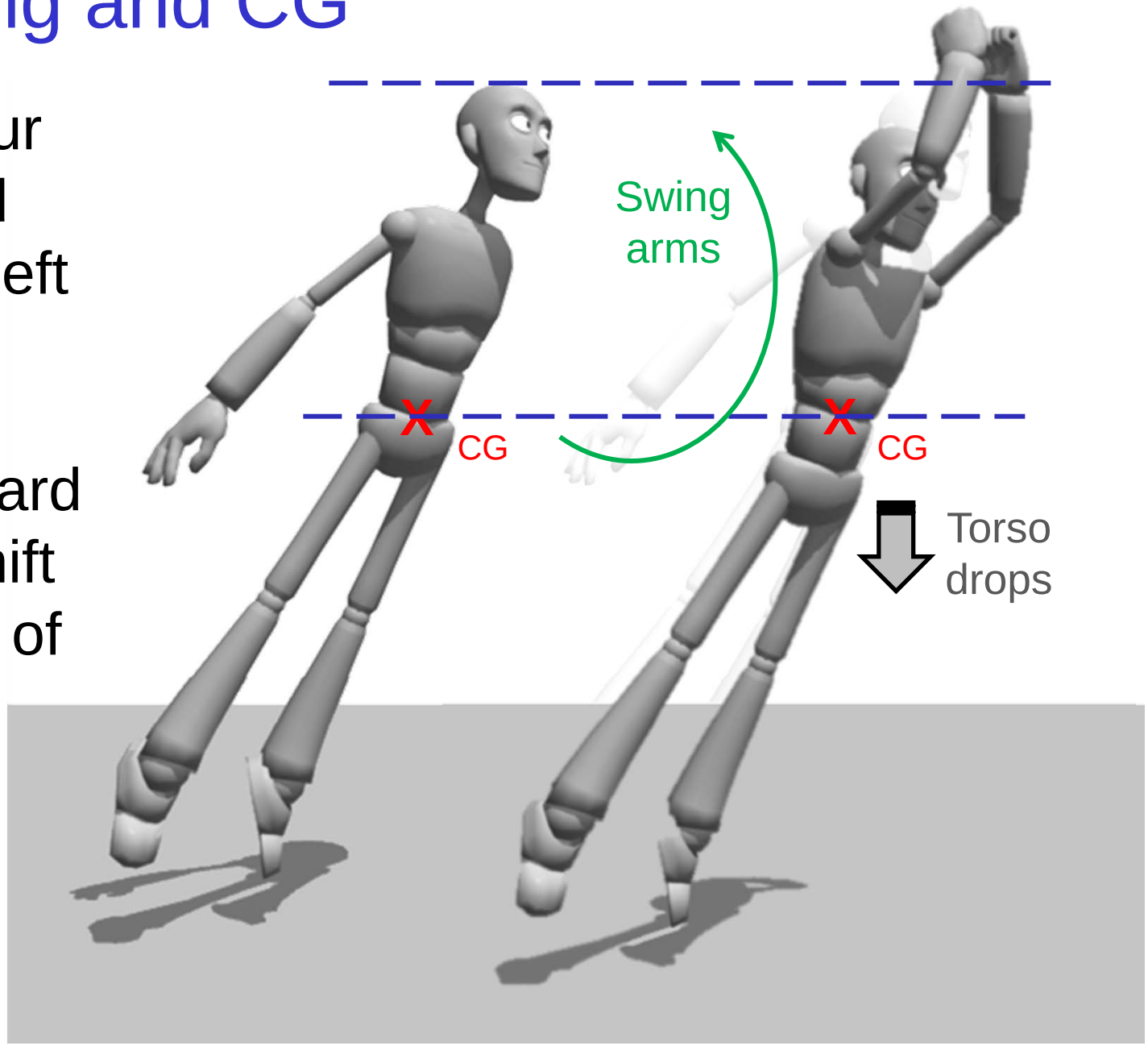


Incorrect Arm Swing

Arm swing occurs *after* feet have left the ground.

Arm Swing and CG

Throwing your arms upward *after* you've left the ground pushes your body downward due to the shift of the center of gravity.



Arm Motion while in the Air

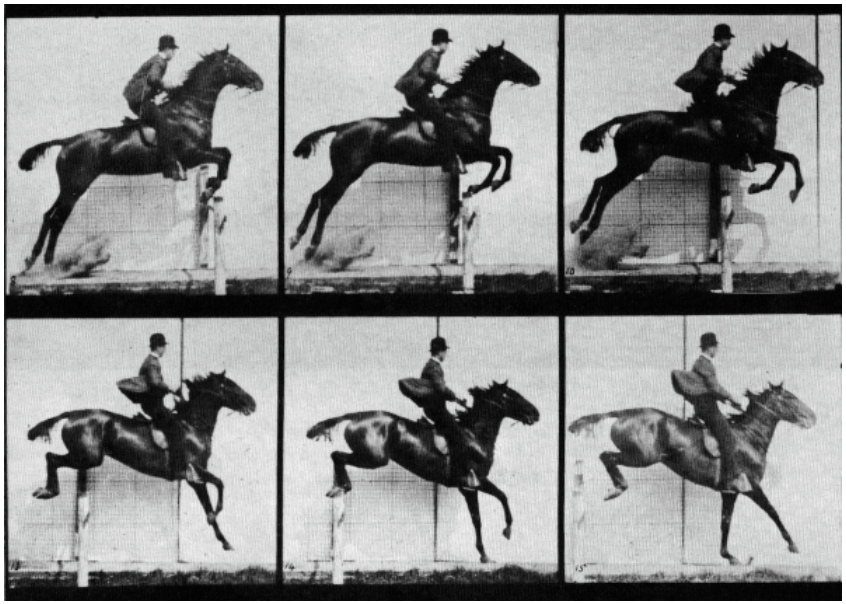
Moving arms or legs in the air shifts the center of gravity within the body but does not raise or lower the center of gravity from the ground.

Long jumpers move their arms and legs to control the rotation of their body so as to land feet first.

Passive Overlapping Action

Swinging the arms is an example of an active overlapping action.

The movements of hair, clothing, etc. are passive overlapping actions.

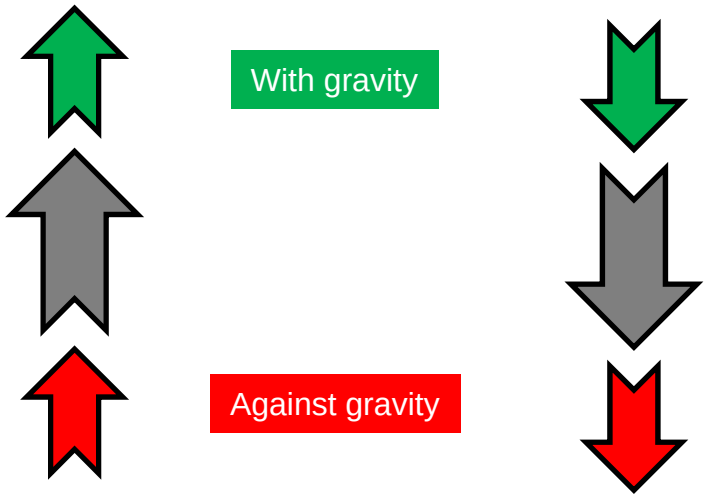


Weight Gain and Loss

Take a heavy object in your palm and move it up and down; notice how the object's weight changes.

Rising &
Slowing Down:
Lose Weight

Falling &
Speeding Up:
Lose Weight



Rising &
Speeding Up:
Gain Weight

Falling &
Slowing Down:
Gain Weight

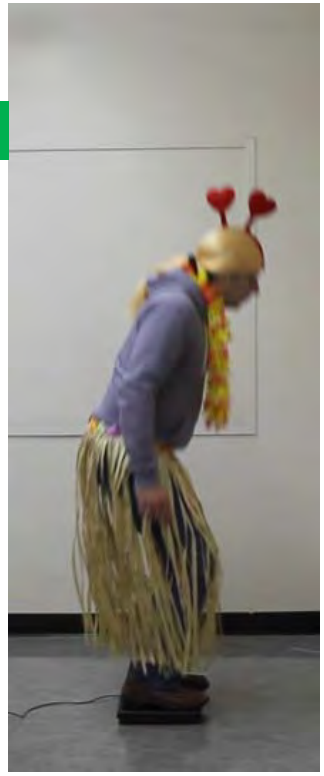
Weight Gain & Loss in a Jump

Let’s analyze the weight gain and loss in this jump.

Weight Gain & Loss in a Jump

Falling & Speeding Up: Lose Weight

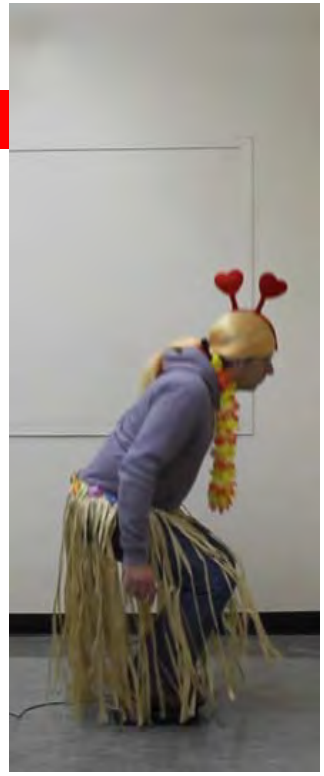
With gravity



Dropping into the crouch.

Falling & Slowing Down: Gain Weight

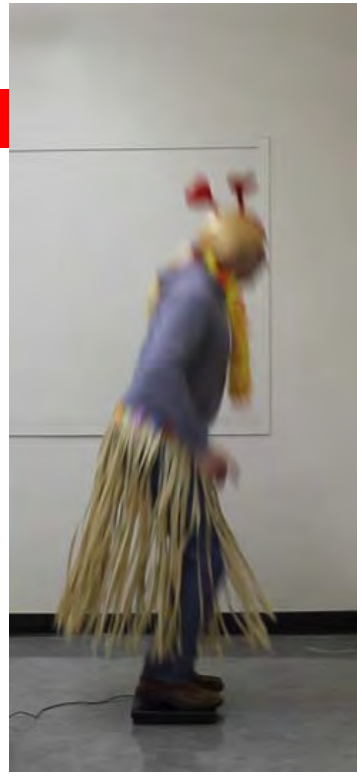
Against gravity



Slowing into the bottom of the crouch.

Rising & Speeding Up: Gain Weight

Against gravity

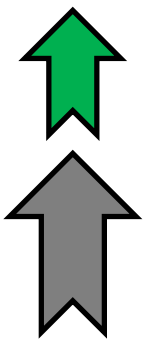


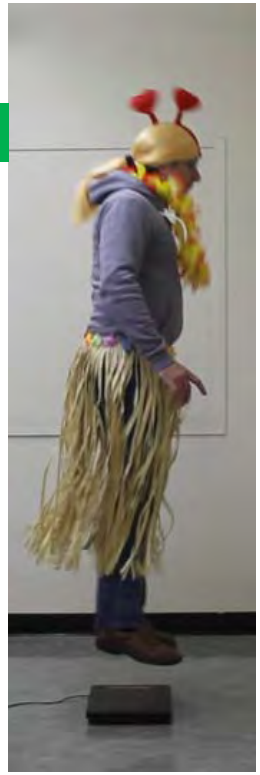
Pushing upward.

Weight Gain & Loss in a Jump

Rising & Slowing Down: Lose Weight

With gravity

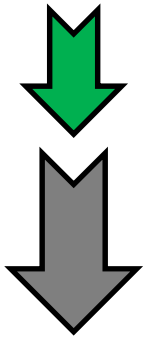


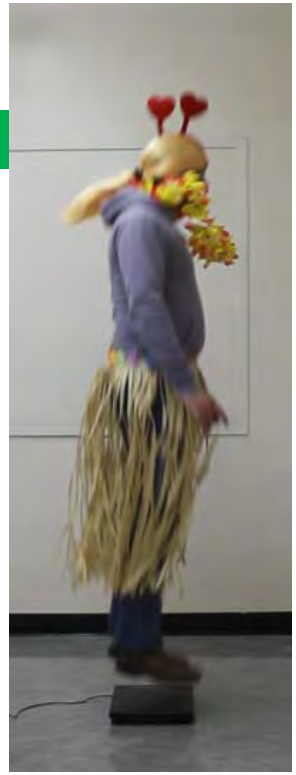


Flying upward.

Falling & Speeding Up: Lose Weight

With gravity

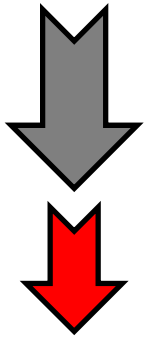




Falling back downward.

Falling & Slowing Down: Gain Weight

Against gravity

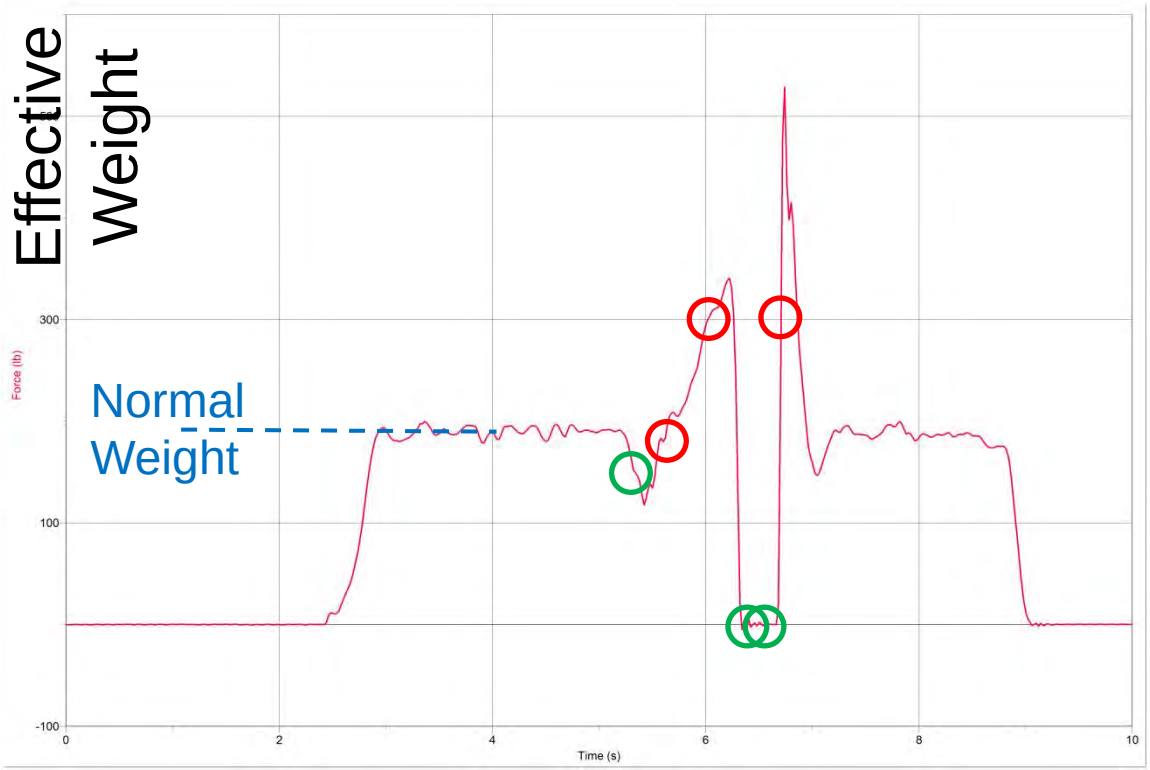


Slowing after the landing.

Force Plate Analysis of a Jump

- Dropping into the crouch.
- Slowing into the bottom of the crouch.
- Pushing upward.
- Flying upward.
- Falling back downward.
- Slowing after the landing.

Measured weight in the jump



Time

Summary

- Overlapping action is any secondary motion occurring with the primary motion.
- Active overlapping actions may be timed to be in support of the primary action.
- Swinging the arms increases the height of a jump if done while feet on the ground.
- Passive overlapping actions in a jump are affected by weight gain and loss.
- Weightlessness occurs while in the air.