Animation for Games

Week 7

Character Animation: Walk Cycle

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Aims for this session

- Understand the importance of the walk in Animation and for Games in particular;
- Know the Walk process in 3D Computer Animation;
- Understand the mechanics of the walk in an orthograde biped, as a reference to character animation;
- Learn the creation of expressive walks (*timing – rhythm*) using a rigged character.

Walk

- How do people walk?

Walk

- How do people walk?

Walking is about managing the balance of the body – or the unbalanced condition, to be more precise.

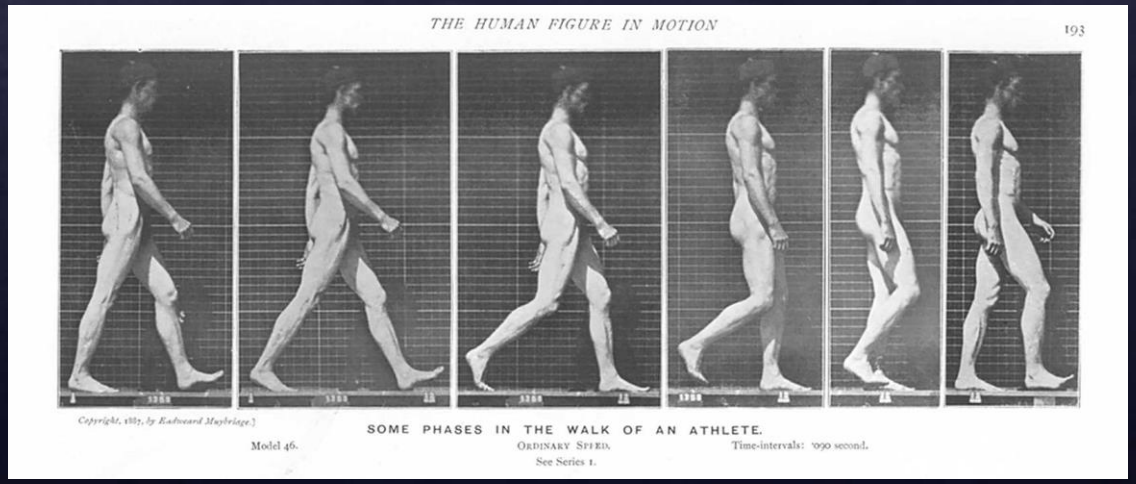
For a person to walk, she/he needs to get her body out of balance – it is basically falling forward in each step until the other foot catches the body.

Observation of human locomotion

- How each part of the body moves?
  - At what time?
  - Why? What is the relationship/dependency among them?

Be critical in your research/analysis – just because it is published (e.g. in a book, website, etc.) does not mean it is correct and good as reference to be followed.

Breakdown of movement into its main poses

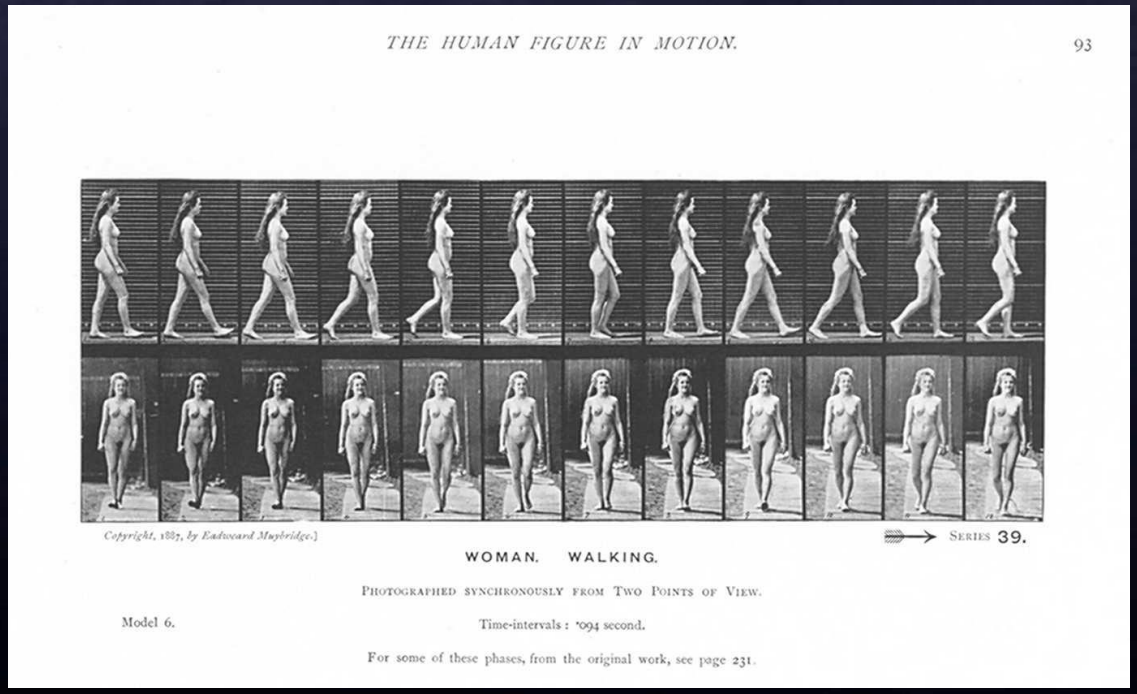


by Eadweard Muybridge

As an animator, you need to decompose each imagined movement into its poses and then create those poses for the animation software to interpolate and generate the in-betweens.

Animation for Games

Breakdown of movement into its main poses



THE HUMAN FIGURE IN MOTION. 93

Copyright, 1887, by Eadweard Muybridge.] SERIES 39.

WOMAN. WALKING.

PHOTOGRAPHED SYNCHRONOUSLY FROM TWO POINTS OF VIEW.

Model 6. Time-intervals : ·094 second.

For some of these phases, from the original work, see page 231.

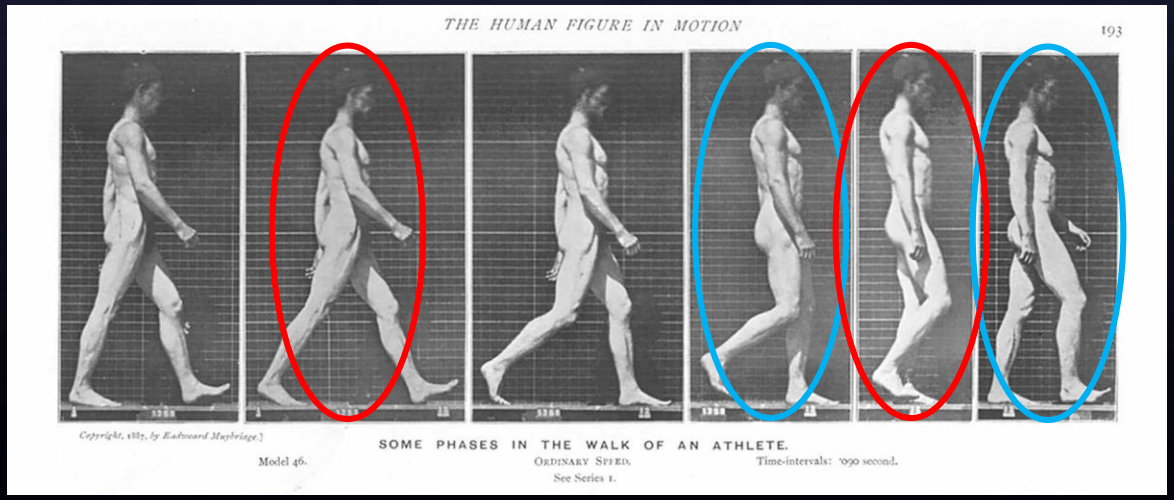
by Eadweard Muybridge

Walk

If you were to animate in the Straight Ahead method, you could just replicate those decomposed poses, BUT to create a walk cycle you need to use the Pose-to-Pose method of animation and, therefore, you really need to identify the main poses (Key Pose/Extreme (a), major Breakdown (b) and secondary Breakdowns (c,d) for each step (poses are mirrored at midpoint of cycle).

Walk

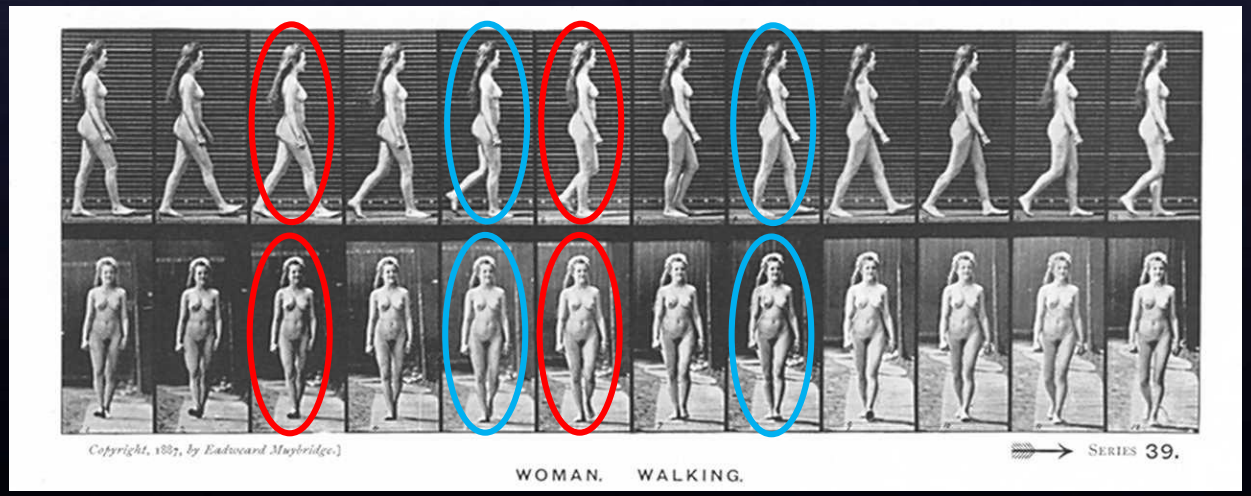
Key Pose/Extreme (a), major Breakdown (b) and secondary Breakdowns (c,d)



(a) (c) (b) (d)

Walk

Key Pose/Extreme (a), major Breakdown (b) and secondary Breakdowns (c,d)



(a (c) (b) (d)

Animating a Walk Cycle is a very difficult task

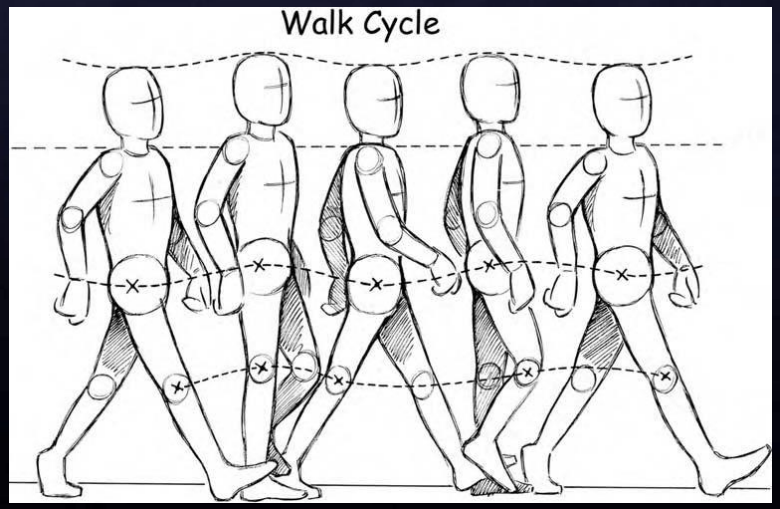
You need to approach the process in a very systematic way

It needs to produce a perfect loop – the start and end poses must match, or, to be more precise, the pose in the end frame must correspond to the pose immediately before the one in the start frame (otherwise it will produce a hold);

Any strange movement of a body part will be easily noticed when the repeated walk motion is played.

Example of the two main poses for each step of a forward walk movement:

- Extreme (Contact position or Stride), which is usually also a Key Pose – (a);
- Breakdown (Passing position) – (b).



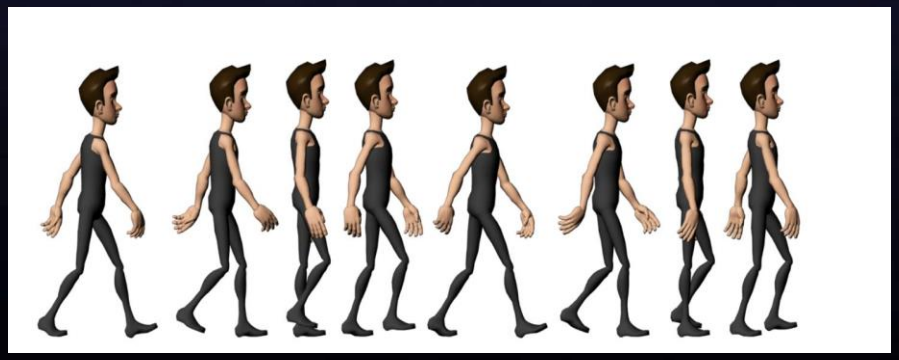
Walk Cycle, main poses

(Webster 2005, p. 68)

Creation of the main poses of a walk, using a 3D character

Define the character's mood and personality (Consider the *Power Centre* concept)

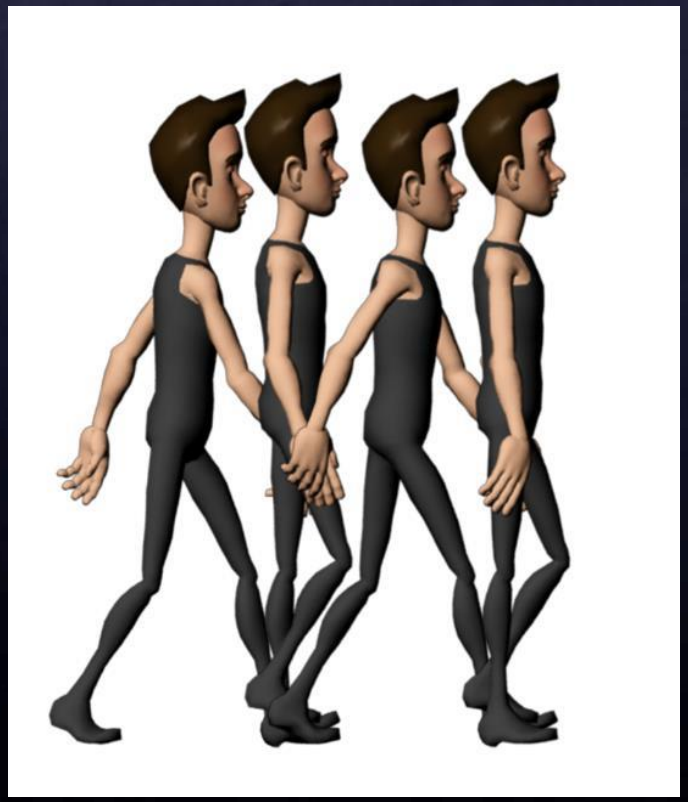
Remember that you can recognize someone you know from a distance (where you cannot see the face) or in a crowd, by the way she/he moves/walks.



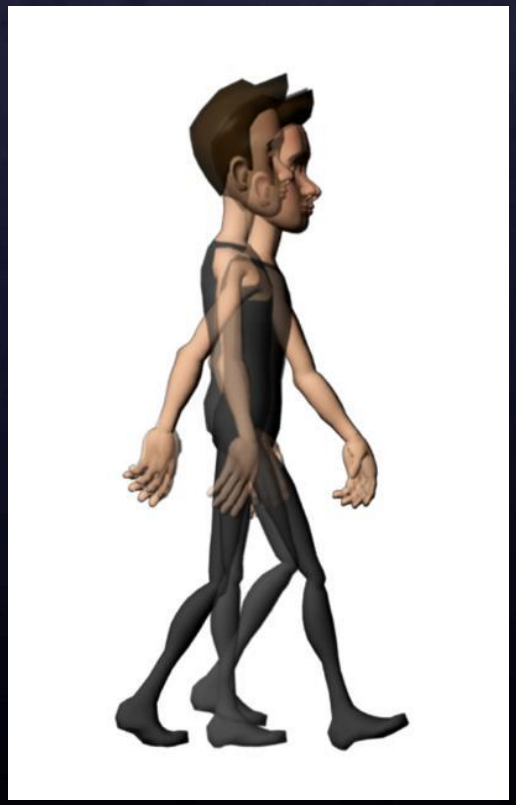
(a) (c) (b) (c) (a) (c) (b) (c)

Walk cycle -- Key Pose/Extremes (a), major Breakdowns (b) and secondary Breakdowns (c)

Forward Walk Cycle vs in place Walk Cycle



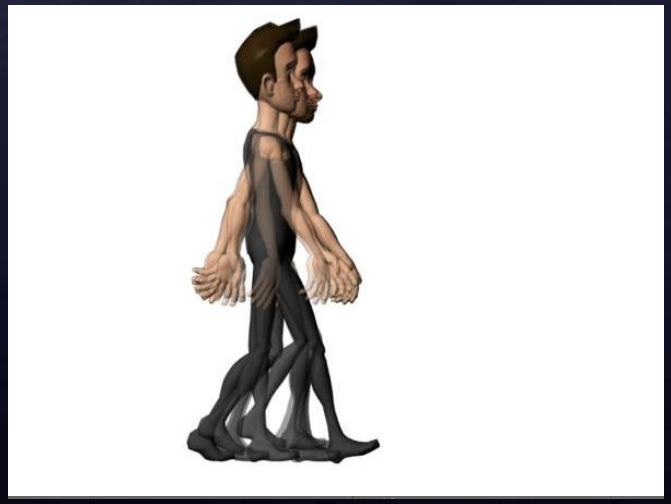
Extremes and major Breakdowns in forward walk



Extremes and major Breakdowns in a walk cycle in place

Animating a Walk Cycle in place

The illusion of moving forward

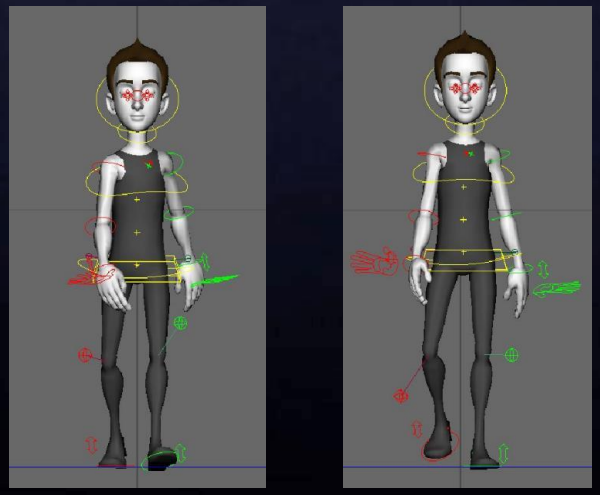


Extremes and Breakdowns in a walk cycle in place

In fact, the supporting foot slides backwards at a constant speed (i.e. constant distance from one frame to the next).

Animating a Walk Cycle in place

First, focus on the feet and legs – the arrangement of the body parts depends on which foot/leg is supporting the body at each moment of the walk movement.

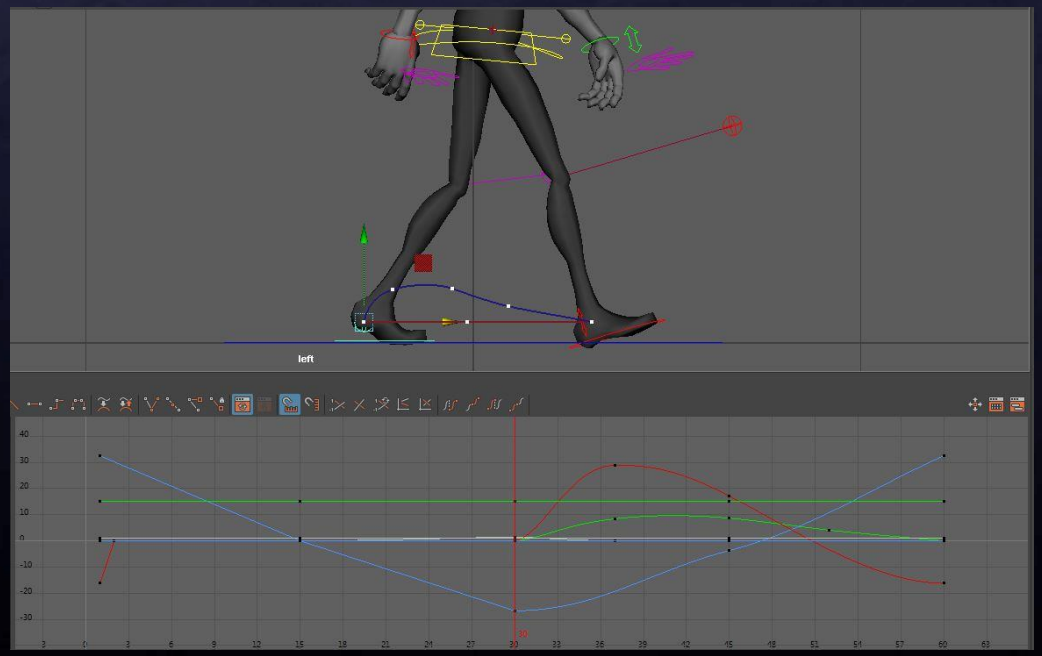


(a) (b)

(a) Extreme (Contact position), (b) Breakdown (Passing position)

Animating a Walk Cycle in place

Once the heel touches the ground …



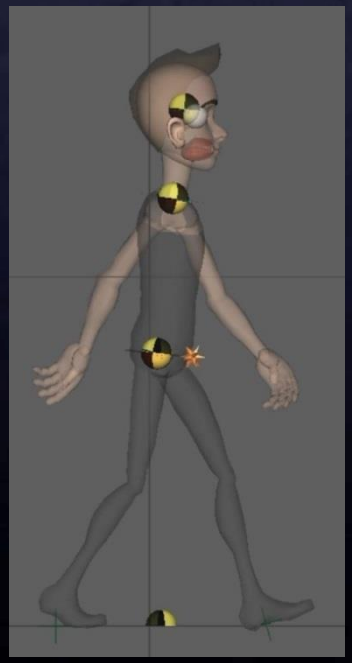
Animating a Walk Cycle in place

… the entire foot must be on the ground in the next frame or two, in order to express the natural weight of the body.

Then that foot must slide backwards, at a constant speed, until the other foot touches the ground and repeats the movement.

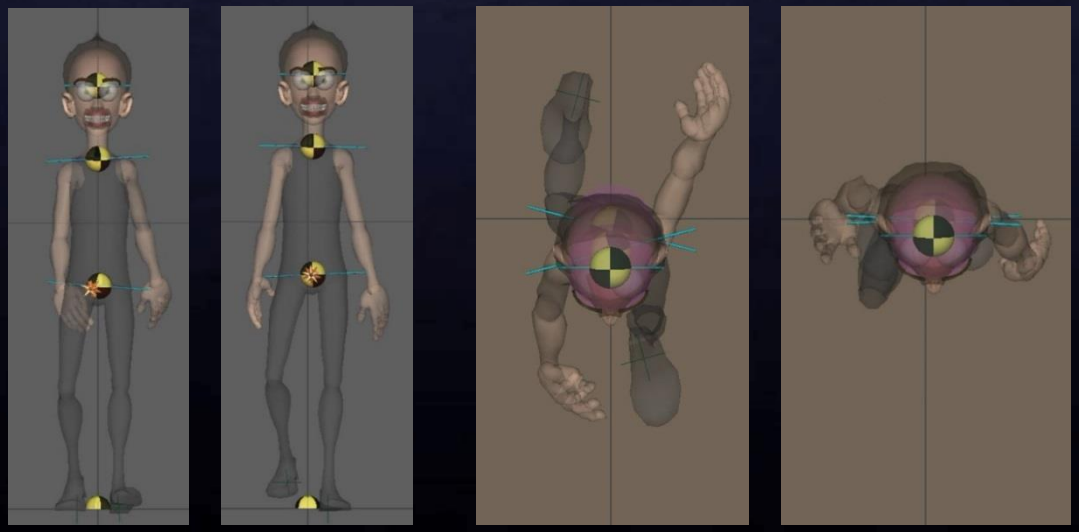
Animating a Walk Cycle in place

Upper body, working the movements up and down, as well as forwards and backwards



Animating a Walk Cycle in place

Then the torso, working the weight distribution. When walking, a person goes from a *Contrapposto* pose (in the Breakdown) to a *Serpentine Line* pose (in the Extreme/Contact position)



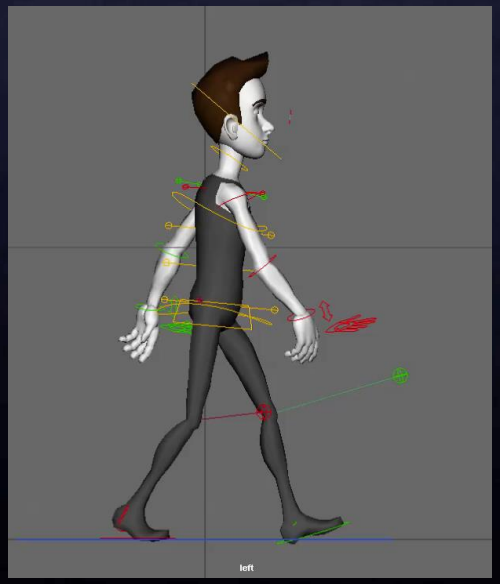
Animating a Walk Cycle in place

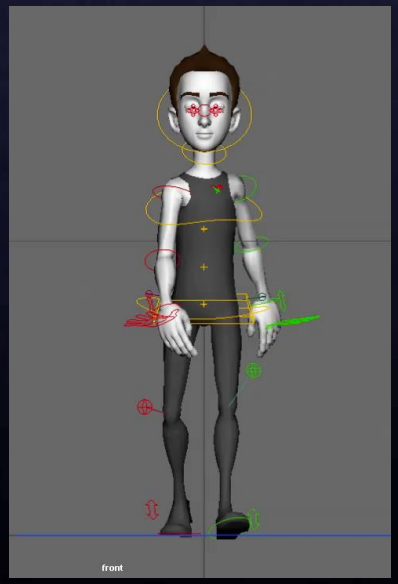
Then the head, applying the *Follow through* principle.

And finally the arms and hands (make sure you consider the *Arcs* principle)

Animating a Walk Cycle in place

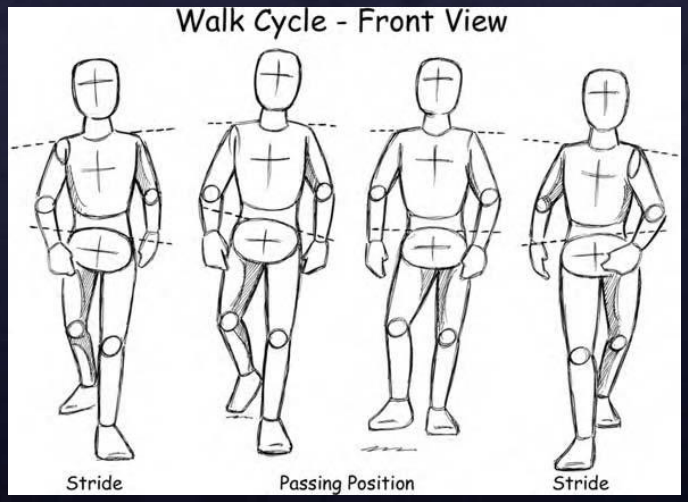
The next step is to work the *Timing* and *rhythm* of the motion of each body part, using the Graph Editor (video).





Animating a Walk Cycle in place

Errors to avoid:

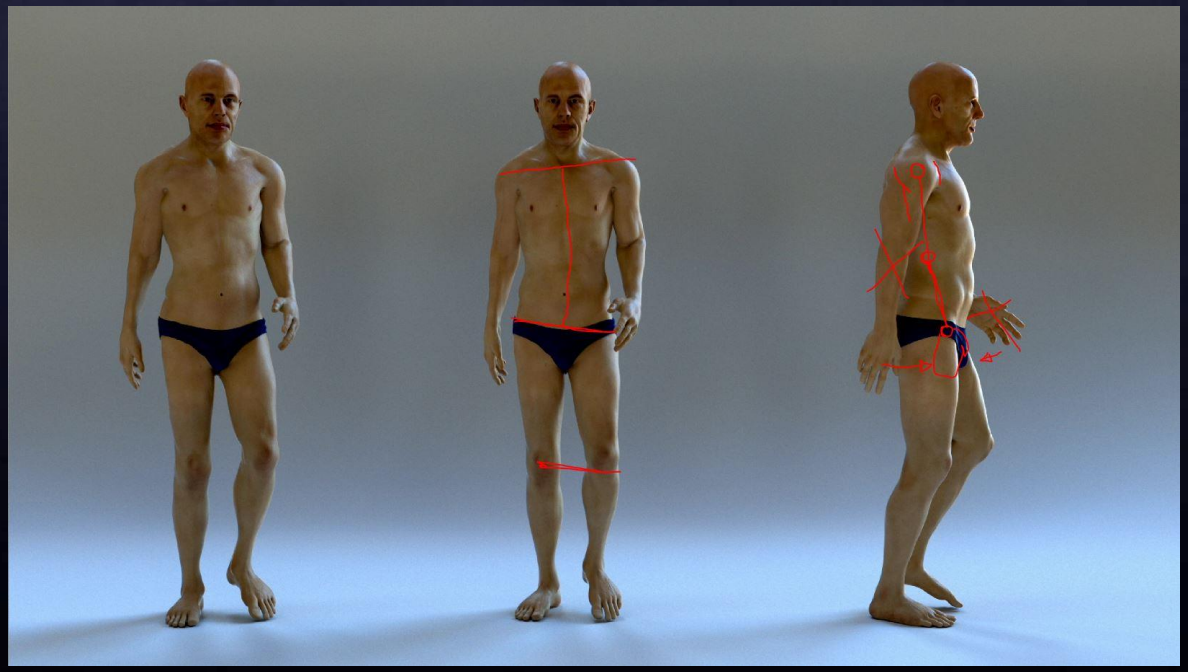


Example of incorrect weight distribution (Webster 2005, p. 77)

Example of incorrect weight distribution. The lateral tilt of the pelvis should be in the opposite orientation, which would then promote the opposite tilt orientation of the shoulders.

Animating a Walk Cycle in place

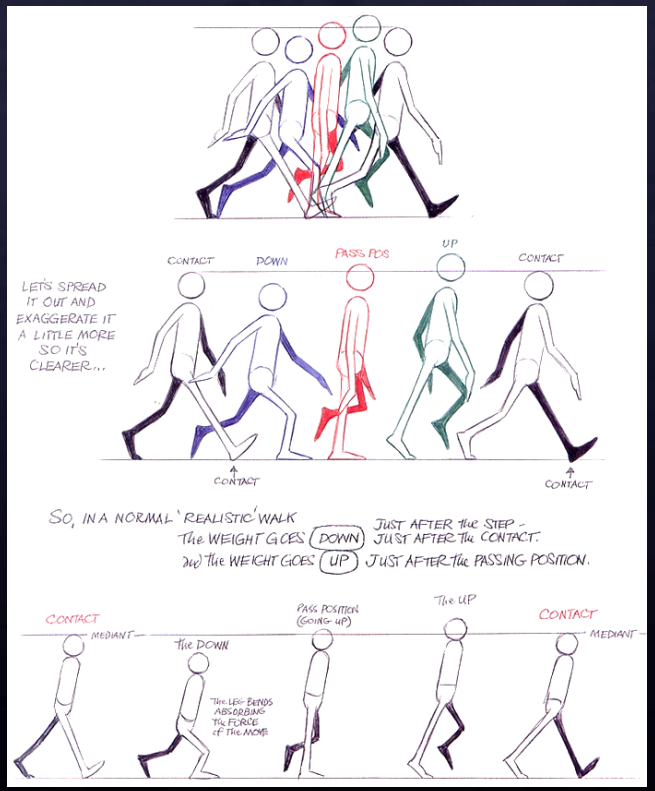
… and another example:



(from the video tutorial by Jahirul Amin)

Animating a Walk Cycle in place

Or the cartoony style of walking, when the character is not a cartoon:



Cartoony Walk Cycle (Williams 2001, p. 108)

Next step

Practice animating a walk cycle

Questions?