

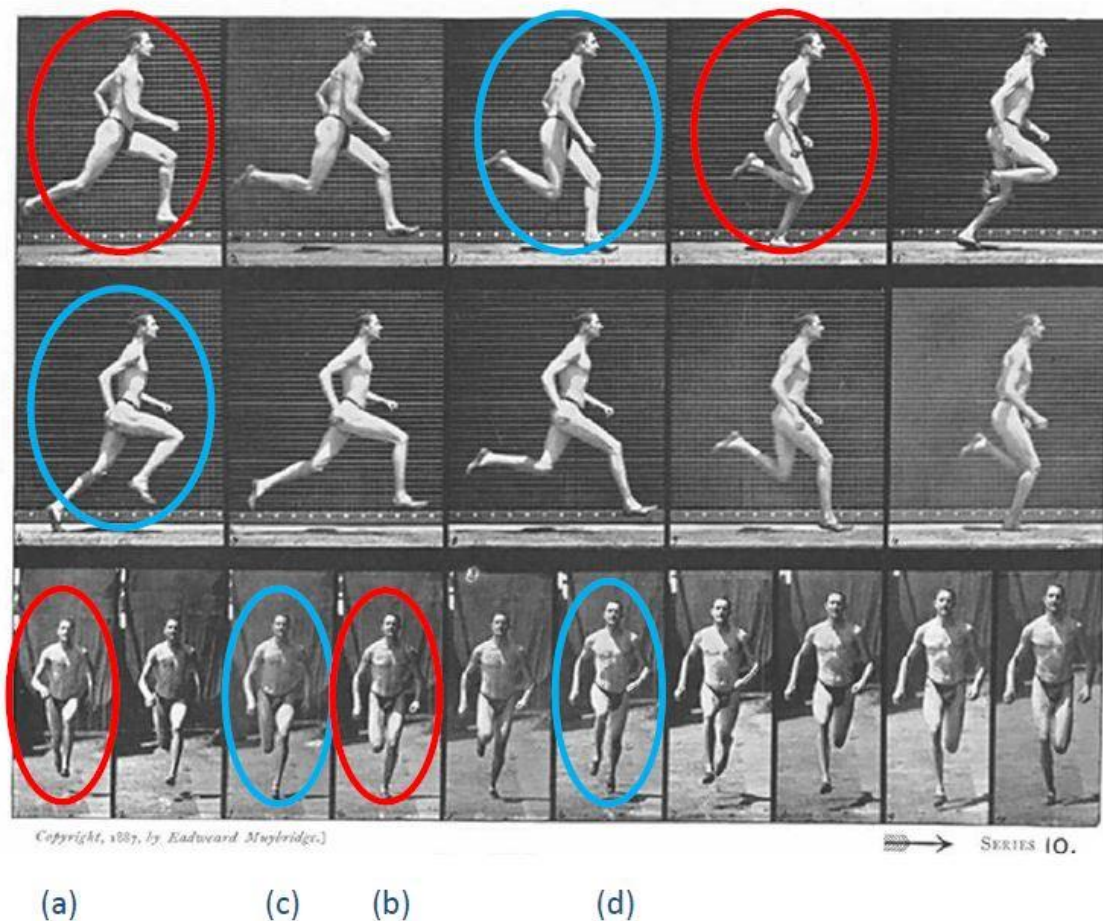
Animation for Games

Labs 15 and 16 – Run Cycle

Aims:

- Experience the process of animating a run cycle in 3D Computer animation, using Maya
- Practice the creation of the main poses of a running biped character, using a rigged character

The Run Cycle follows a similar rationale and workflow to the walk cycle **but** includes a suspension pose (none of the feet in contact with the ground), as discussed in the lecture. Observe the main poses, below:



Extreme pose (a), major Breakdown (b) and secondary Breakdowns (c,d)

And another example, with a more ordinary people kind of running:

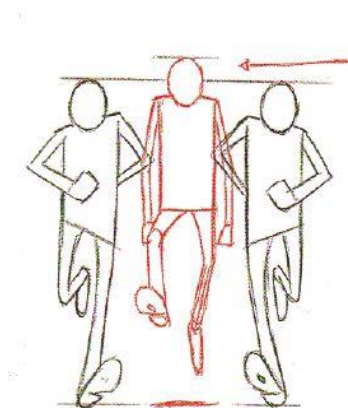


... where the foot going down touches the ground with the heel:



There are some differences from the walk cycle:

- The arms are more bent and don't swing so much.
- The upper body leans forward in every pose – the faster it runs, the more it leans forward.
- When you raise the body in the up position, do it only for the equivalent to half of the head, or even a third of the head (see image below).



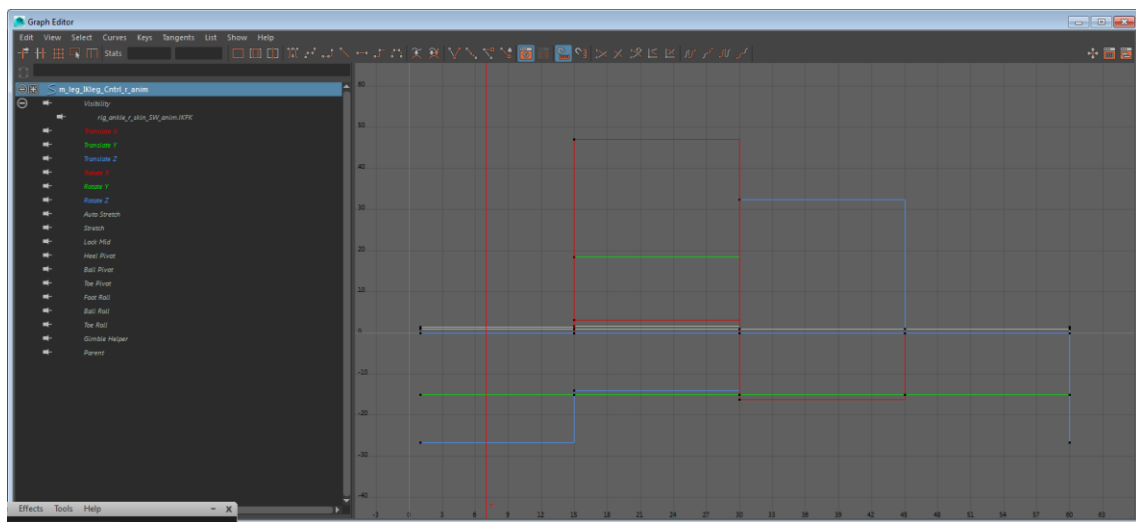
Up and down (Williams 2001, p. 178)

Again, using Maya 2018, open the scene named Animation_Character_AFG.ma

First, set the project properly in Maya,

Then, check the Animation preferences:

- Activate Auto Key;
- Set framerate to 60 FPS;
- Set tangents to Stepped mode.



Example of *Stepped tangents* mode

Now, considering what was discussed in the previous lecture (8), animate a run cycle in place, using the provided character.

First thing to do with the character in the T-pose, is to put the arms down, including (very important) the shoulders.

Suggested workflow is similar to that of the walk cycle:

- Define the Key Pose (for a run cycle, usually it is the Extreme);
- Establish the length of the step (stride). This depends on how fast or slow you want the run to be;
- Create the main poses for the two steps (Extremes, major Breakdowns and then the secondary Breakdowns) at the corresponding keyframes, on *stepped tangent* mode;
 - Define
 - The feet positions (including the appropriate bending);
 - Upper body up and down motion;
 - Upper body lateral alignment (in the Passing position);

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- Upper body forward and back motion;
 - Tilt of the pelvis and shoulders;
 - Twist of the pelvis and shoulders;
 - Arms and hands/fingers motion.
- Adjust the *timing* of the motion of each body part from one keyframe to the next, using mainly the Graph Editor (adjusting the curves tangent accordingly). Remember that the body parts do not move all at the same time and at the same speed (for example, in the Passing position (major breakdown), the pelvis lateral tilt is led by the engaged leg and the suspended leg is led by the corresponding hip – hip leads the thigh, which leads the leg, which leads the foot – while the shoulders lead the arms, forearms, hands and fingers, and the head is led by the torso);

You need to express that flow of energy through the body – a hierarchy of motion.

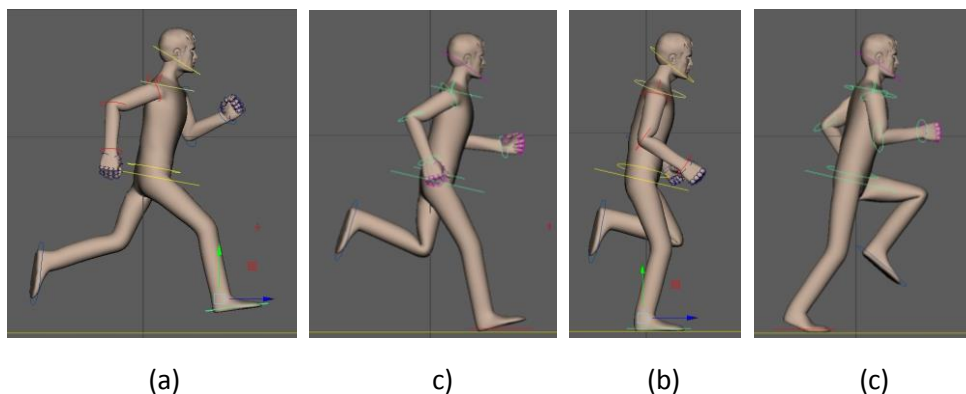
In a one second run cycle (2 steps) for games, I recommend the duration of half a second, or 2/3 of a second. For half of a second option, the main poses should to be set at the following keyframes in the timeline:

1, 15 and 30 are the Extremes (or Suspension Positions) and

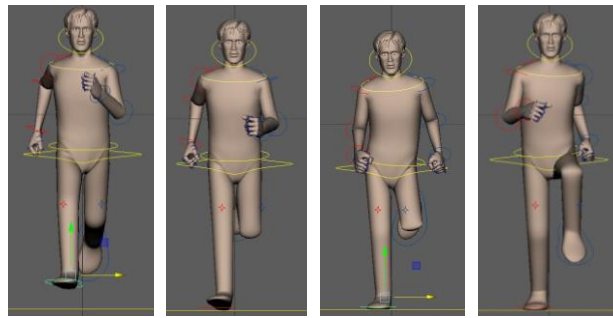
8 and 22 are the major Breakdowns (or Passing Positions);

5, 11, 19 and 25 are secondary Breakdowns.

Start with the Extreme pose, then the Breakdown pose. The two secondary Breakdowns will depend on the two first poses, as they will be placed in between.



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



For the second step, you will replicate these poses but with the limbs in a reversed position, similarly to the walk cycle.

An easy way to determine the position of the secondary Breakdowns is by changing the tangents (in the Graph Editor) of the adjacent Extreme and Breakdown to linear – this interpolates the in-between position and you just need to tweak the attributes and the curve, later, to make sure the movement has the right timing and describes a smooth arc.

As mentioned in the suggested workflow (above), start each pose from the feet, or foot, contacting with the ground and then continue up to the pelvis, top of the torso, neck, head, shoulders, arms, hands and fingers.

Once the foot in the back side gets off the ground, it should describe a smooth curved path up and forward, simultaneously – an arc.

As soon as the foot in the front side touches the ground, it must start moving/sliding backwards at a constant speed. Immediately after the foot lands completely on the ground, the pelvis must tilt to the opposite side, in response to the weight shift.

Then, a few frames later, the shoulders must tilt to the opposite direction of the pelvis.

The lateral tilt of the pelvis must happen very quickly (in just one frame) because it is forced by the foot touching the ground. Likewise with the tilt of the shoulders.

For the up and down movements of the upper body, you can use the Body Ctrl to keyframe it; and for the forwards and backwards movements of the upper body you should also use the Top-of-the-Torso Ctrl

For the lateral tilt and translation of the pelvis, use the Pelvis Ctrl, because it allows you to manipulate that part of the body independently.

For the twist of the torso (rotation in the Y axis), use the same Pelvis Ctrl and the Top-of-the-Torso Ctrl.

Regarding the head and neck, use the Head Ctrl.

Don't forget to relax and curl the hands, to give it a natural look.

Remember the concepts introduced in the previous lecture – *Contrapposto* and *Serpentine Line*: when running, a person goes from a *contrapposto* pose (in the passing position) to a *serpentine line* pose (in the contact position), in a continuous cycle.

Finally, don't forget that in order to create a run cycle with a smooth transition between the last frame and the first one, make sure you select all the controls and set a keyframe at frame 29 and then delete frame 30 (which has the same pose as frame 1 and that repetition would produce a subtle pause/hold) and match the tangents orientation of the last frame with the ones of the first frame.