Computer Animation and Games I CM50244

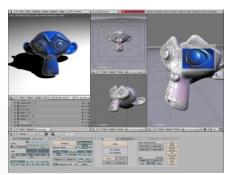
Principles of Animation

Some slides from Dr. Andrew Chinery and Texas Education Agency.

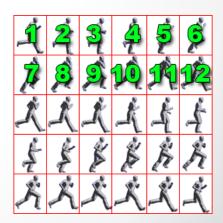
Recap: Graphics Sub-areas

- Imaging
 - how to manipulate images
- Modeling
 - how to manipulate shapes
- Rendering
 - how to create synthesized images from shapes
- Animation
 - how to generate movement over time



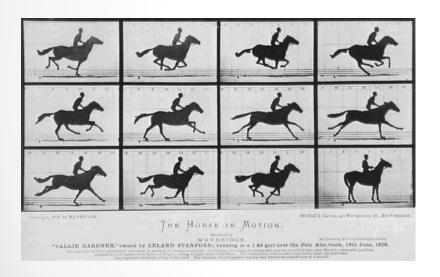


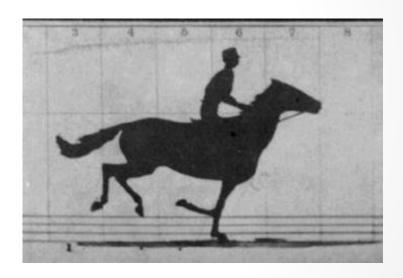




Recap: Animation

 Sequence of images that give perception of movement when played in rapid succession

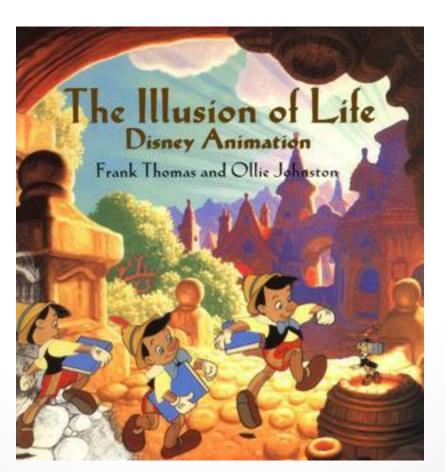




[Horse in Motion by Eadweard Muybridge 1878]

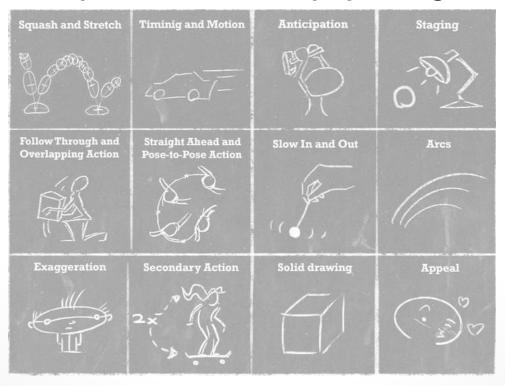
Twelve Basic Principles of Animation

 introduced by Disney animators Frank Thomas and Ollie Johnston in there their 1981 book:



Twelve Basic Principles of Animation

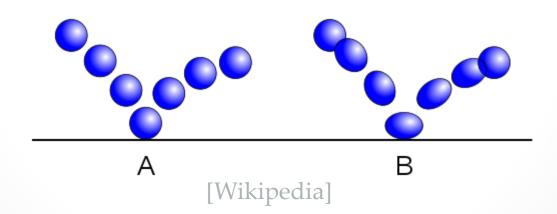
- The goal is to better convey movement and make animation appealing
 - Doesn't always mean to make physics right.



used in Snow White, Pinocchio, Fantasia, Dumbo, and Bambi.

1. Squash and Stretch

- emphasizes motion and impact by giving the illusion of weight and volume to a moving character.
- A bouncing ball will squash when hitting the ground and stretch as it leaves the point of impact.



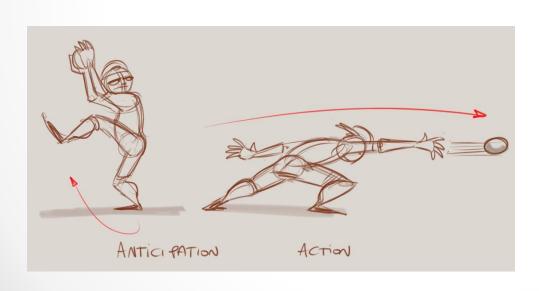
For solid object, the volume is usually maintained while being **squashed** and **stretched**

1. Squash and Stretch

[https://www.youtube.com/watch?v=VaLESWaRMjU]

2. Anticipation

- prepares the audience for an action the character is about to perform.
- use backwards motion to anticipate forward motion
 - o e.g., Before you jump, you bend your knees.
 - o almost all real action has major or minor anticipation





2. Anticipation



[Bec]

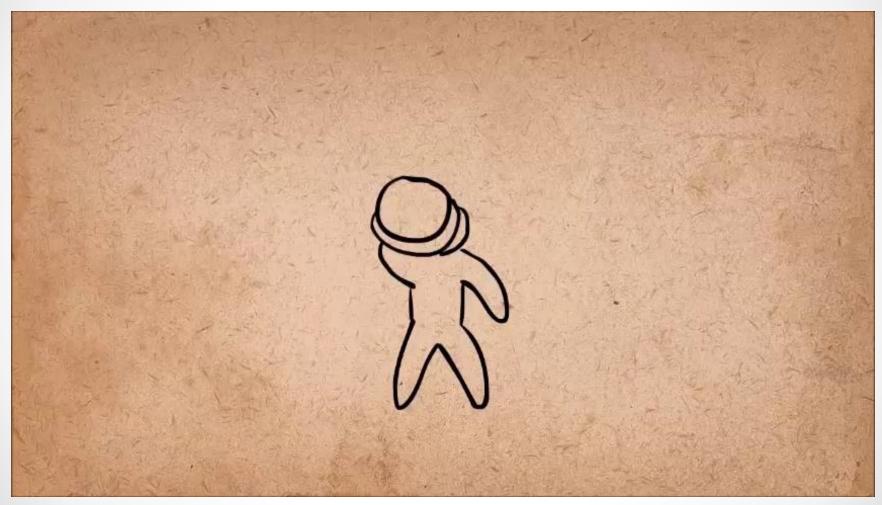
3. Staging

- directs the audience's attention to what is important in a scene.
- Clear communication of idea, mood, attitude using
 - Camera angles.
 - Position of the characters.

0 ...



3. Staging

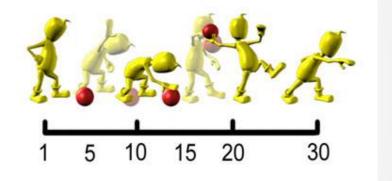


[Bec]

4. Straight Ahead and Pose To Pose Animation

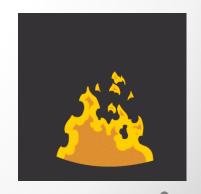
Pose to pose

- o starts with key frames and fills in the intervals.
- Good for most actions in general.
 - Proportions are better controlled.



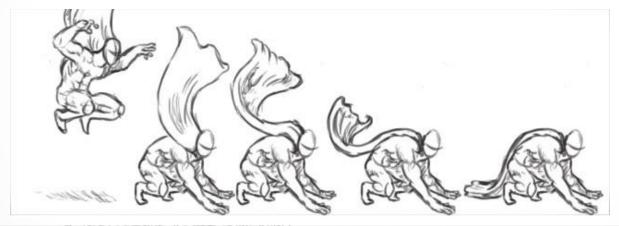
Straight ahead

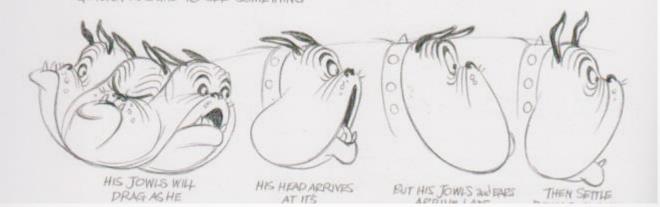
- o draws frame by frame from beginning to end.
- Good for wild action sequences (fire, smoke, fluid, etc.)
 - Hard to maintain size, volume, and proportions.



5. Follow Through and Overlapping Action

- Describe the same effect
 - Loosely tied parts (ears, hair, clothing, etc.) of a body should continue moving after the main body of the character has stopped.





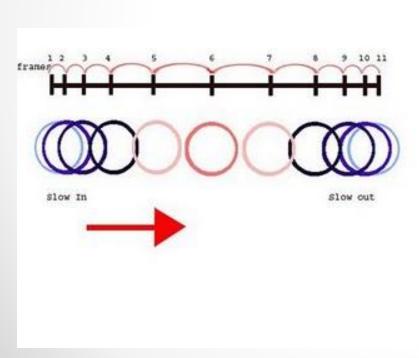
5. Follow Through and Overlapping Action

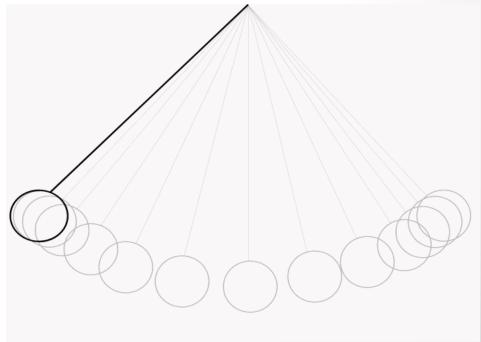


[Shinobi]

6. Slow In and Slow Out

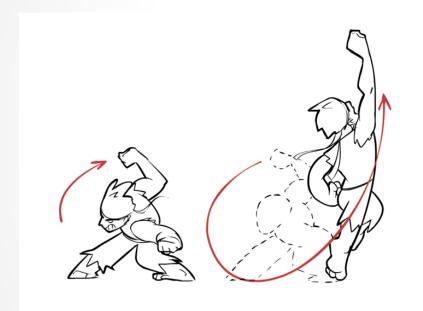
- Most motion starts slowly, accelerates, and then slows again before stopping.
- Animation looks more realistic if has more frames near the beginning and end of an action.

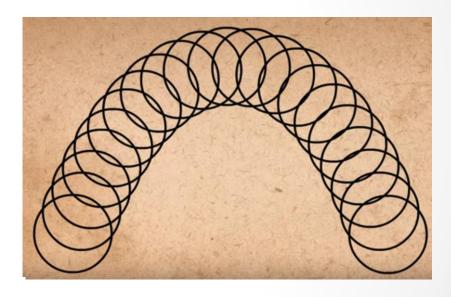




7. Arcs

 Most natural actions follow an arc or circular path (throwing, kicking, etc).

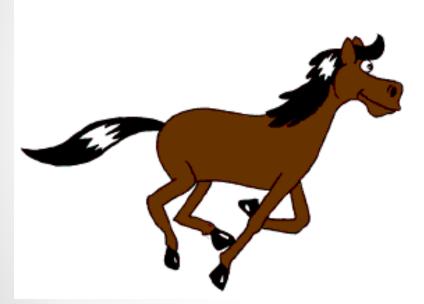




in 3D animation, a motion arc is usually created using a spline curve.

8. Secondary Action

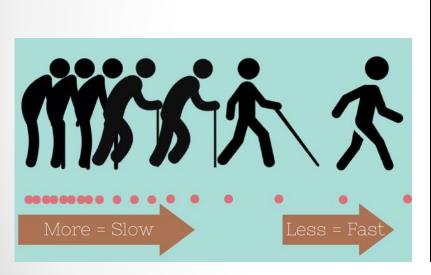
- Minor actions that occur due to a major action.
- supports and reinforces the main action.

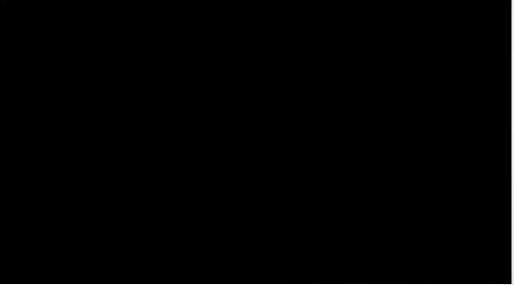




9. Timing

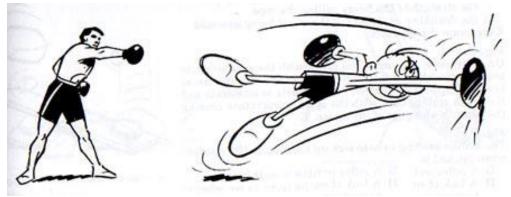
- adjusts number of frames between poses
 - More frames means less movement
- Timing can imply speed, weight, emotion, etc.





10. Exaggeration

 Used to increase the impressiveness of emotions and actions.



 Animators should be careful to keep the action believable (not to over-exaggerate everything)









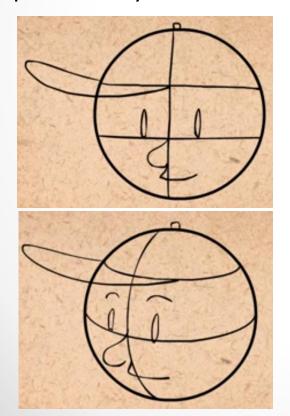
10. Exaggeration

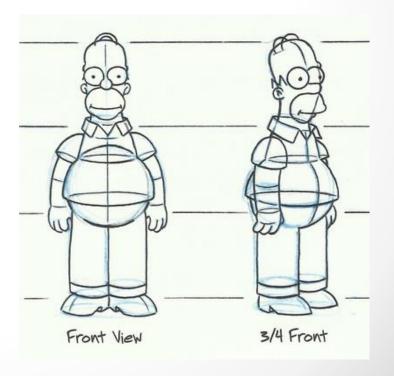


[Street Fighter V]

11. Solid Drawing

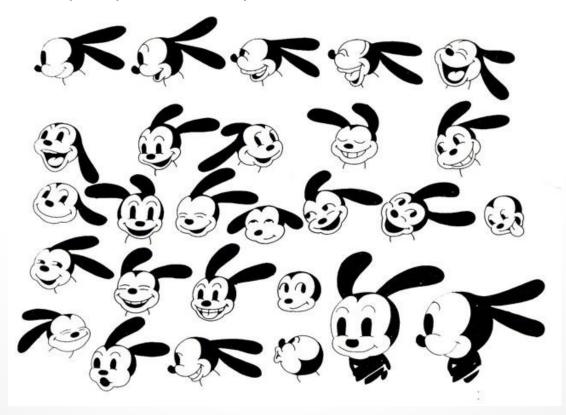
- takes into account forms in three-dimensional space.
- To get maximum feeling from the audience, animated characters must be drawn or modeled precisely.





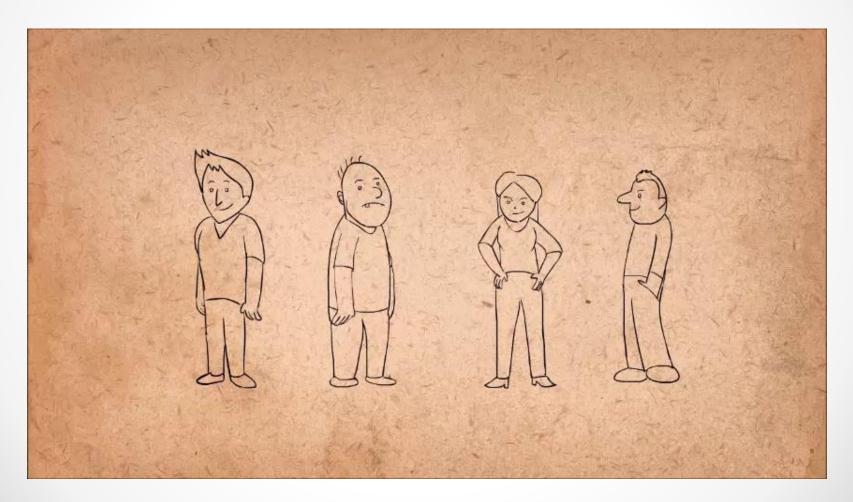
12. Appeal

- Make each animated character appealing
 - highlight emotions (happy, excited, fearful, embarrassed, angry, scared, etc.)
 - reflect unique personality



12. Appeal

• Tricks: play with shape, proportion



• [Bec]

References

- [Las] Lasseter, Principles of traditional animation applied to 3D computer animation, *Proc. SIGGRAPH*, 1987.
- [Atk] Atkinson, Animation Notes, Centre for Animation & Interactive Media, RMIT University.
- [Wik] 12 Basic Principles of Animation, Wikipedia https://en.wikipedia.org/wiki/12_basic_principles_of_animation
- [Bec] Becker, 12 Principles of Animation (YouTube Tutorial)
 https://www.youtube.com/playlist?list=PLbOh8btec4CXd2ya1NmSKpi92U_I6ZJd

Lectures Rescheduled

The last two lectures in week 3 10:15-12:15 20 October Friday

are rescheduled (due to a EU project meeting):

When: ?

Where: ?