

Production Pipeline

Case of Animation Cinema production

Production Pipeline

Fundamental structure for VFX/animation movie production.

Pre-production

*Story, script,
concept art*

Storyboard

Animatic

Layout

Production

Special Effects

Modeling

Rigging

Shading

Texturing

Lighting

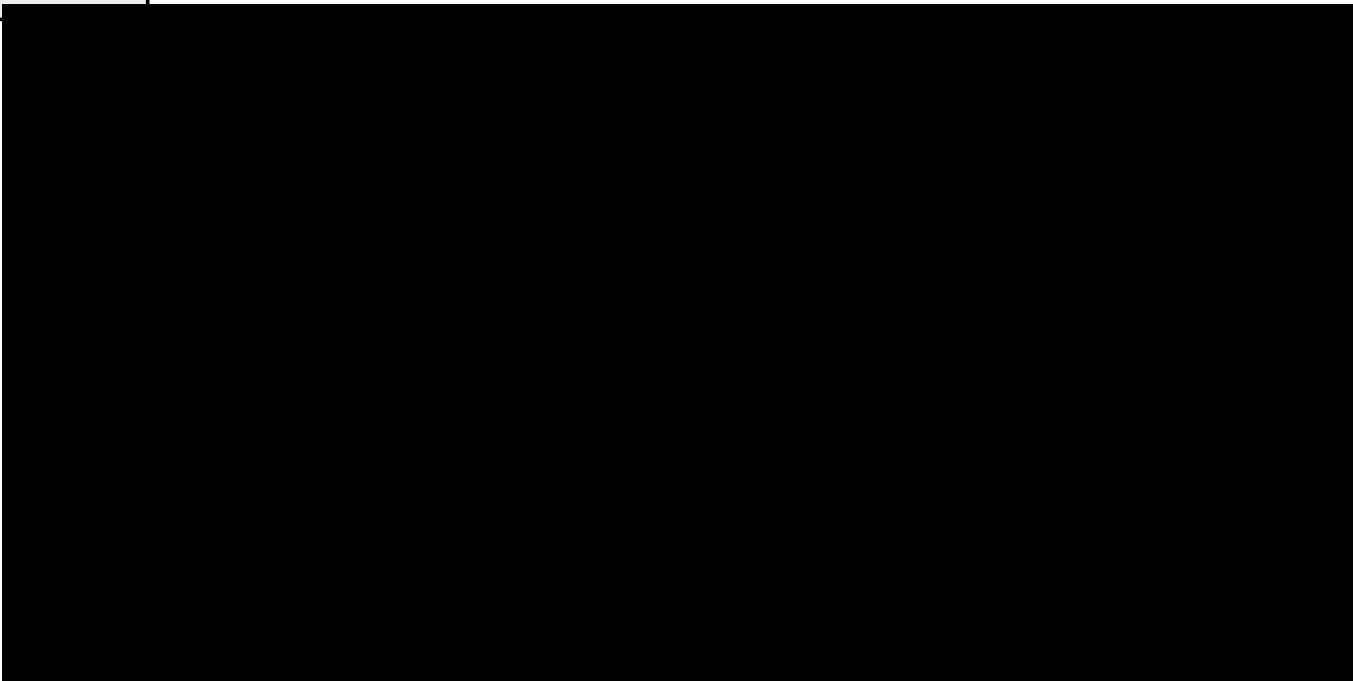
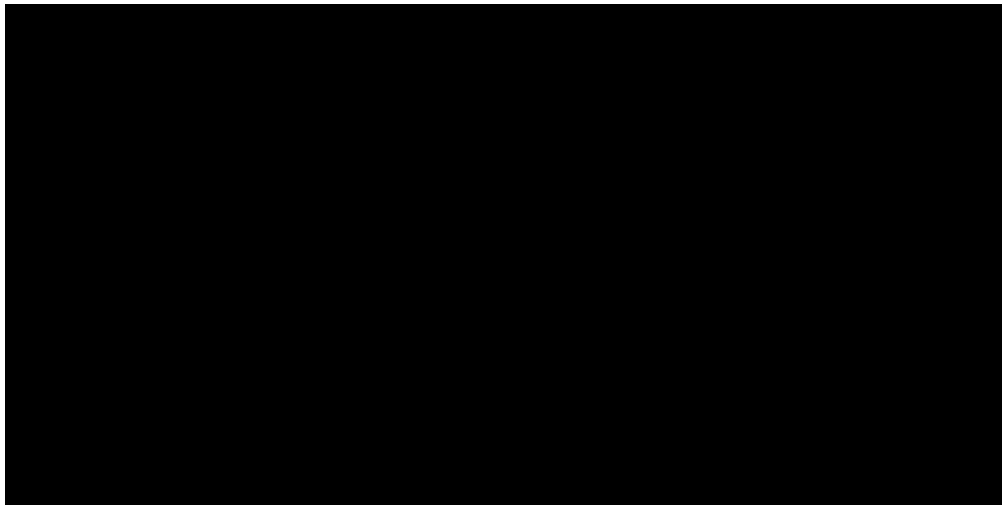
Animation

Rendering

Post-Production

Compositing

Editing



Animatic

≅ Animated story-board, Various format

Rough sense of timing, visual, action: details not necessarily followed precisely in the final version.



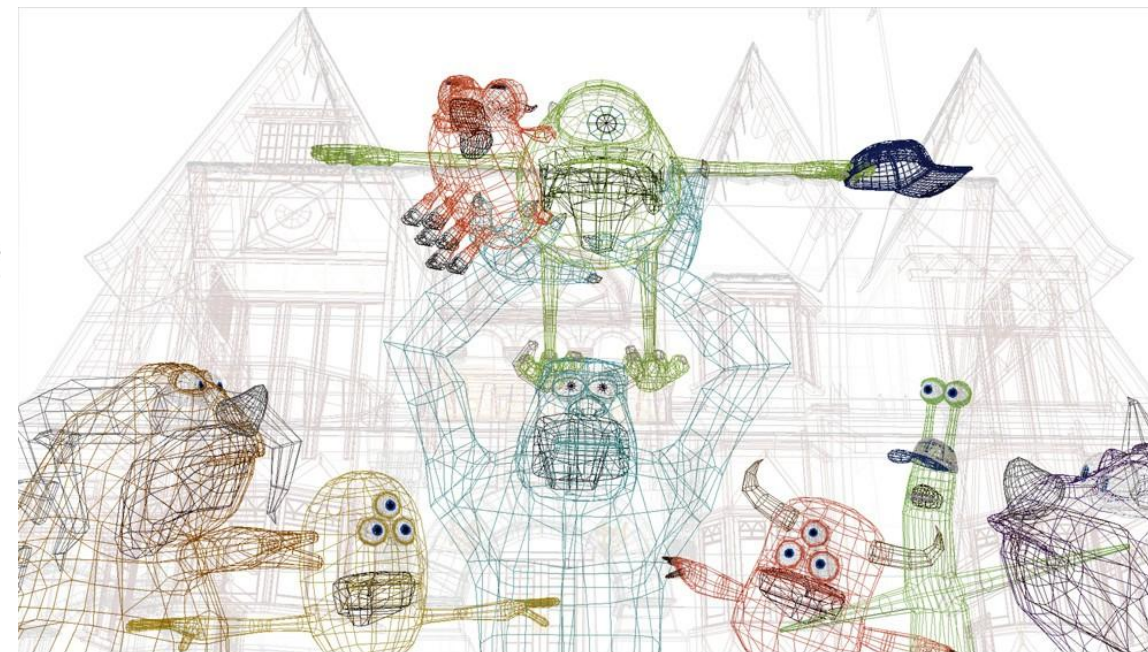
Layout: Moving into 3D

1st step: Rough 3D modeling and placement of

- Camera: visual field, perspective
3D much more constrained than 2D drawings
- Shape volumes, continuity
No details: face, etc.
Choice between 3D/2D elements



"MONSTERS UNIVERSITY" Progression Image 1 of 6: STORY
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"MONSTERS UNIVERSITY" Progression Image 3 of 6: MODELING
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"MONSTERS UNIVERSITY" Progression Image 4 of 6: LAYOUT
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3D Modeling

In production

- Polygonal mesh modeling

Coarse to fine approach

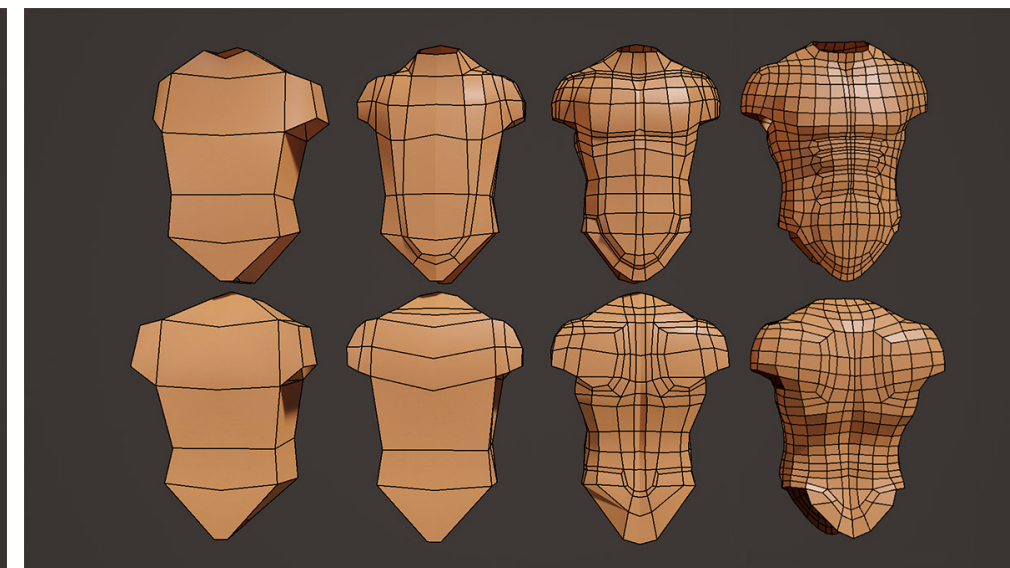
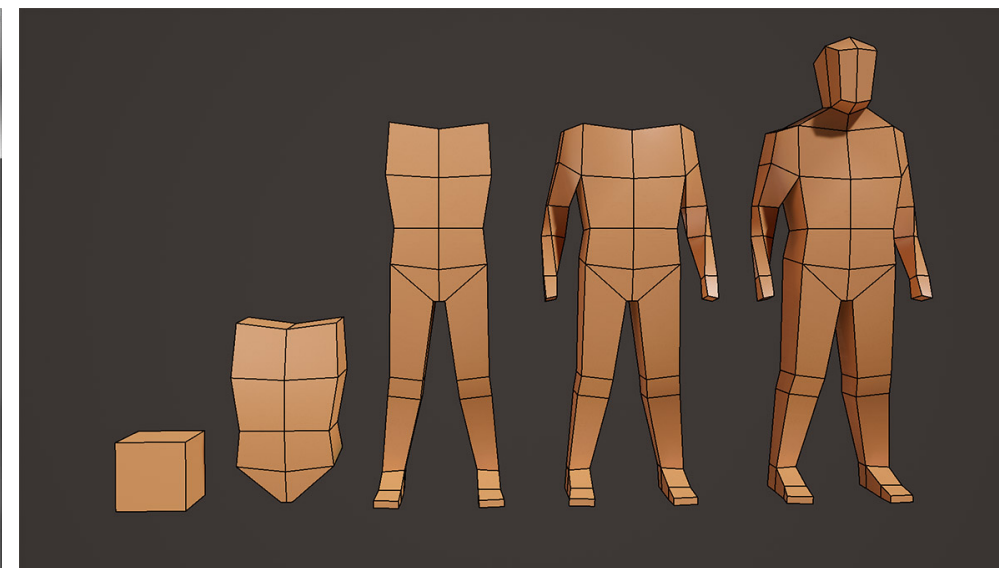
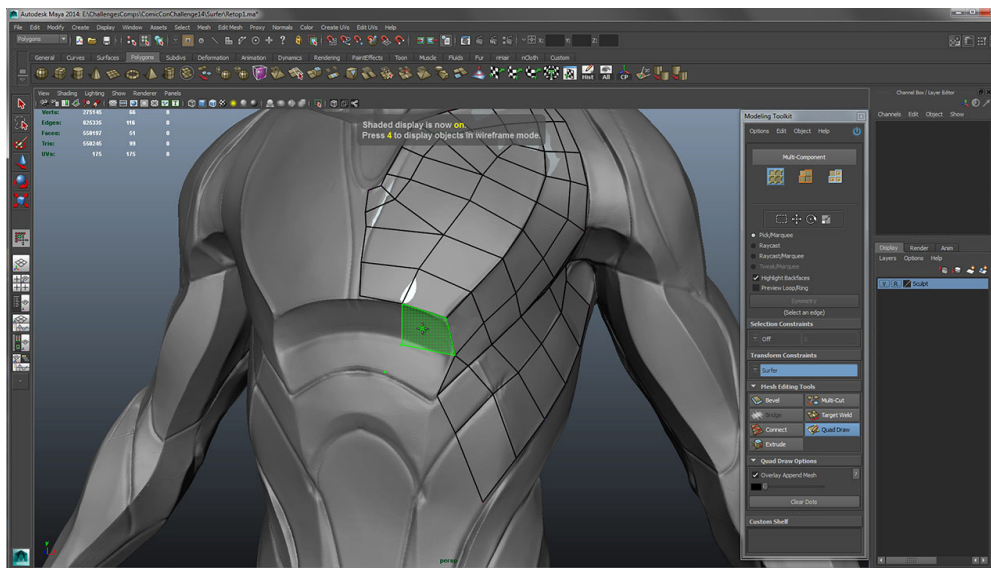
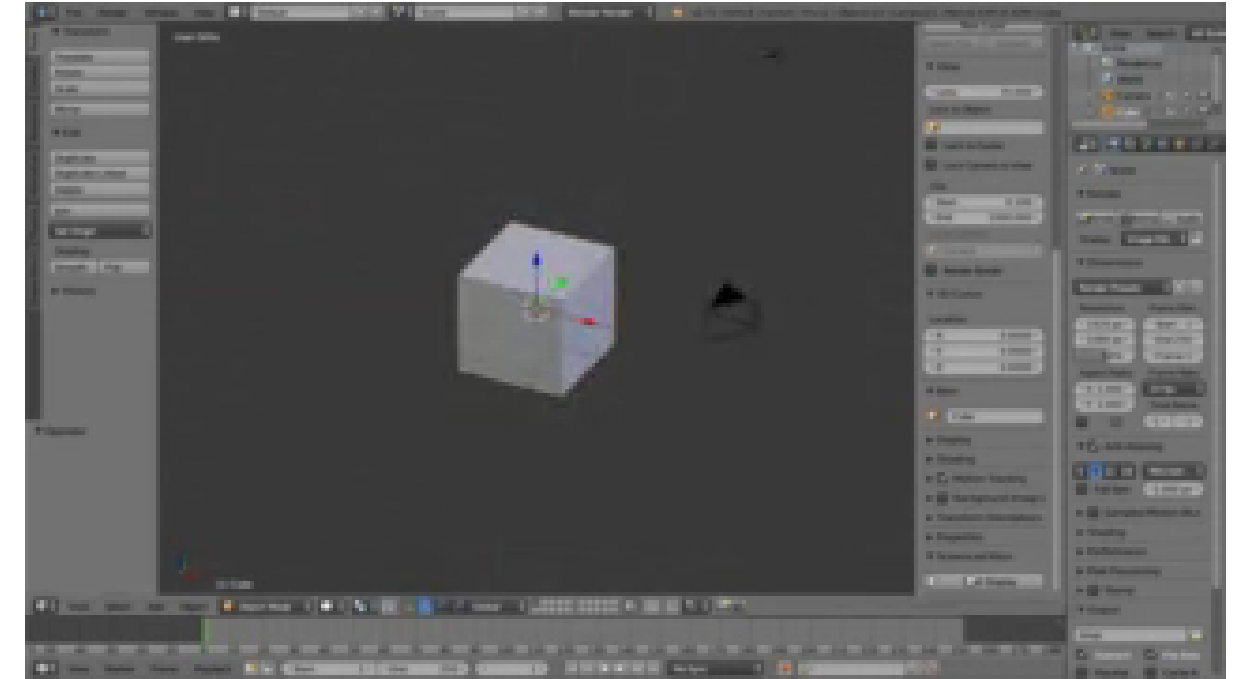
1. Low res modeling (extrusion)

2. Subdivide, Refine

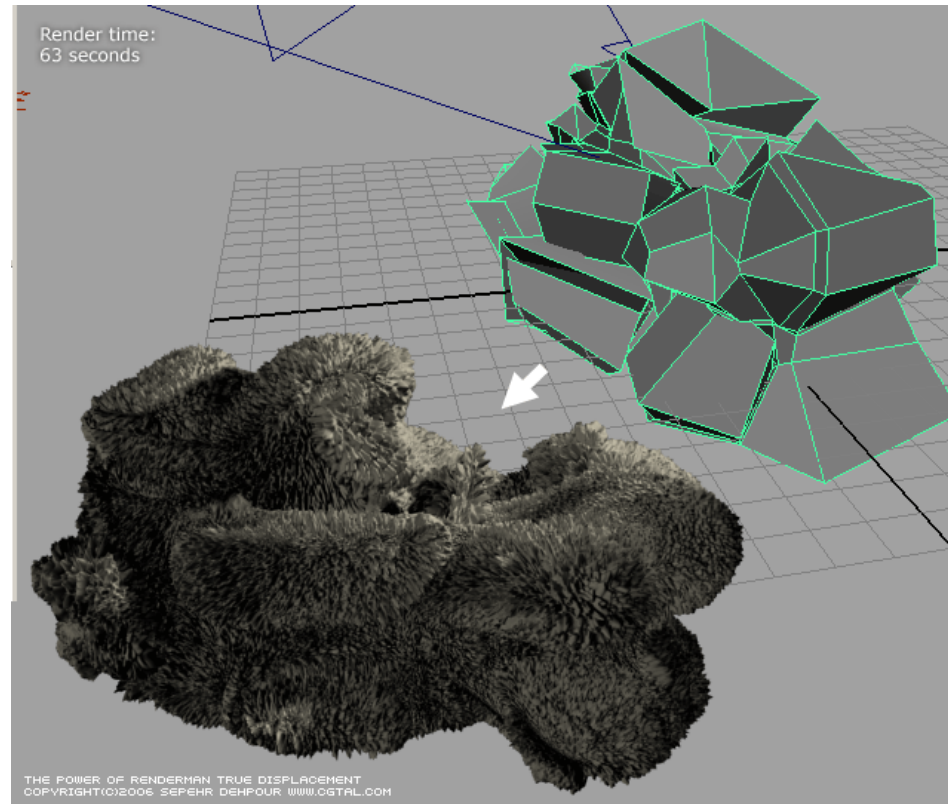
- Parametric (NURBS) modeling

Everything else is "VFX"

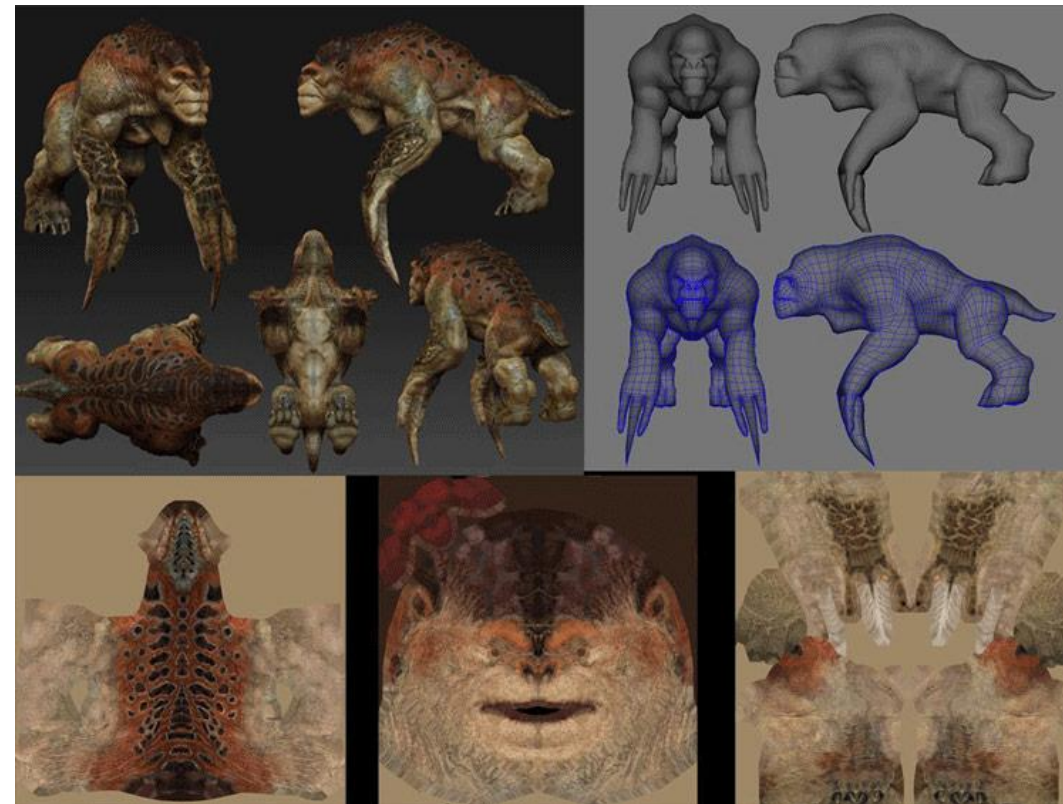
Common tools: Maya, 3DSMax, Cinema4D, Blender, etc.



Modeling appearance - Rendering purpose



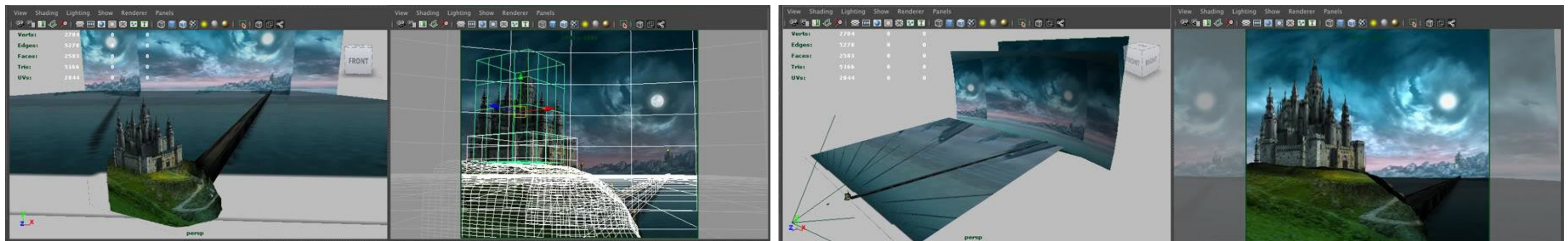
Shading



Texturing



Lighting



Mate painting

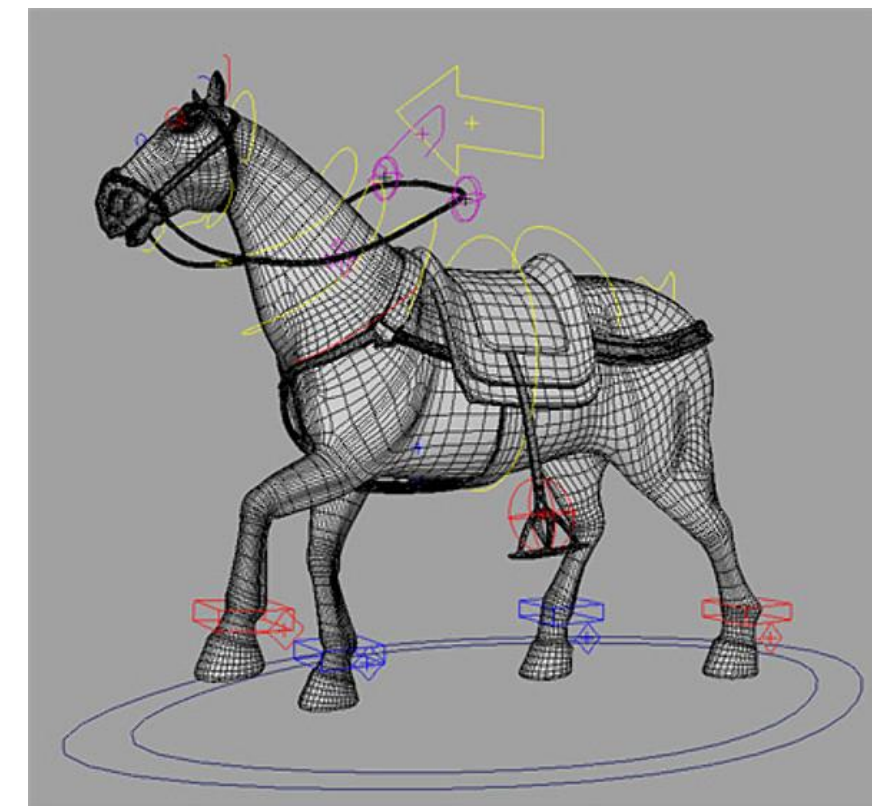
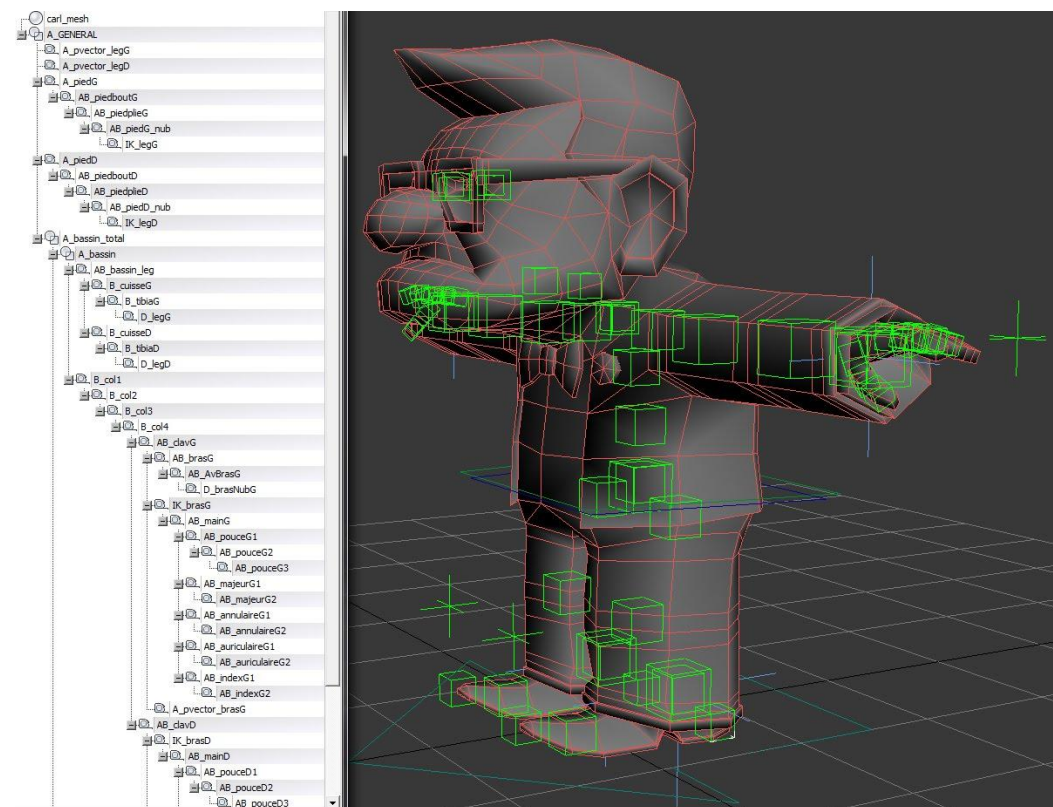
Rigging

Attach deformation handles to the mesh

Each handle (controler) is associated to a deformation - degrees of freedom

Rigging is a technical part

Python script, Mel (Maya), Lua, etc.

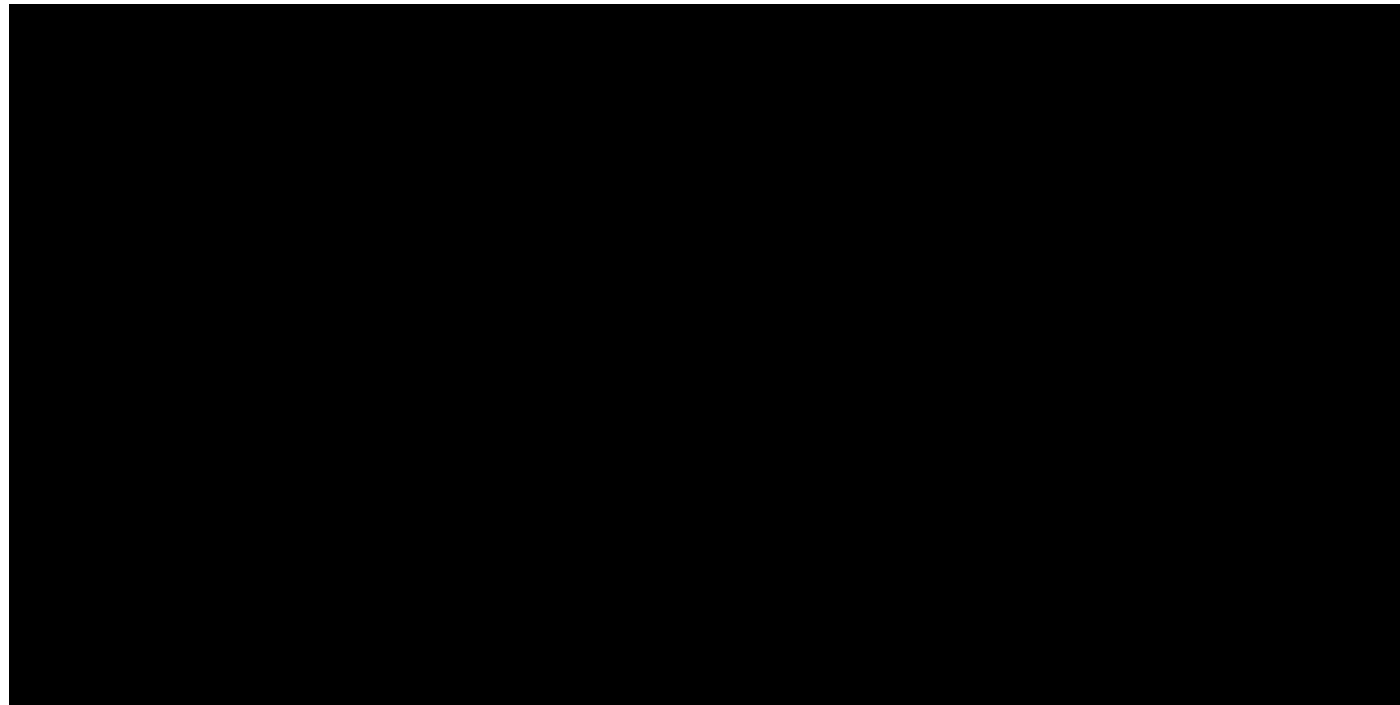


Animation

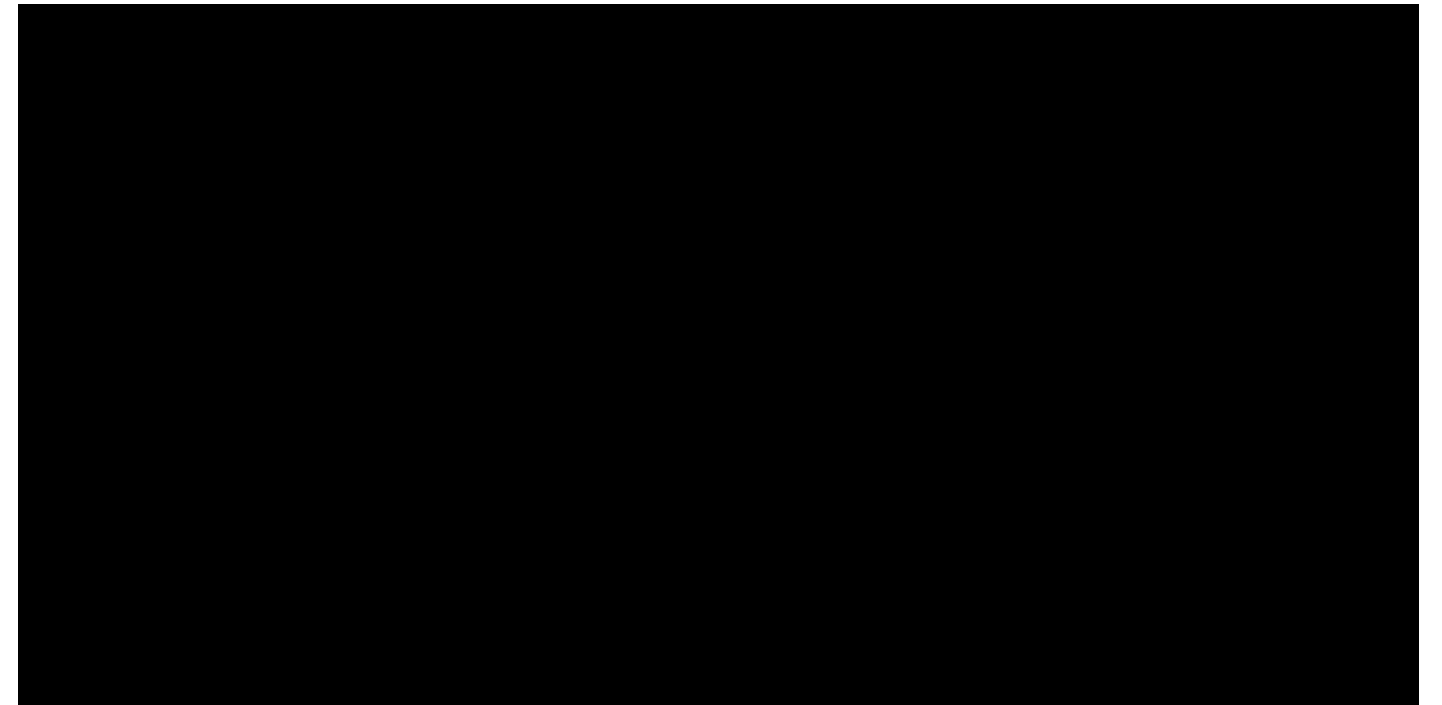
In production terminology: Animation = Key-frame animation of the rigged character

Set animation curves on rig controlers

Everything else is VFX



Animating the walk cycle ($\times 40$)



Result

Up to 75% of artists production studios are animators

Animation = The key element - higher cost - for production studios

One animator $\rightarrow$ 1-10 s of animation per day

Animation sub-parts

1- **Posing** the *key frames*

Set the main general posture of the character

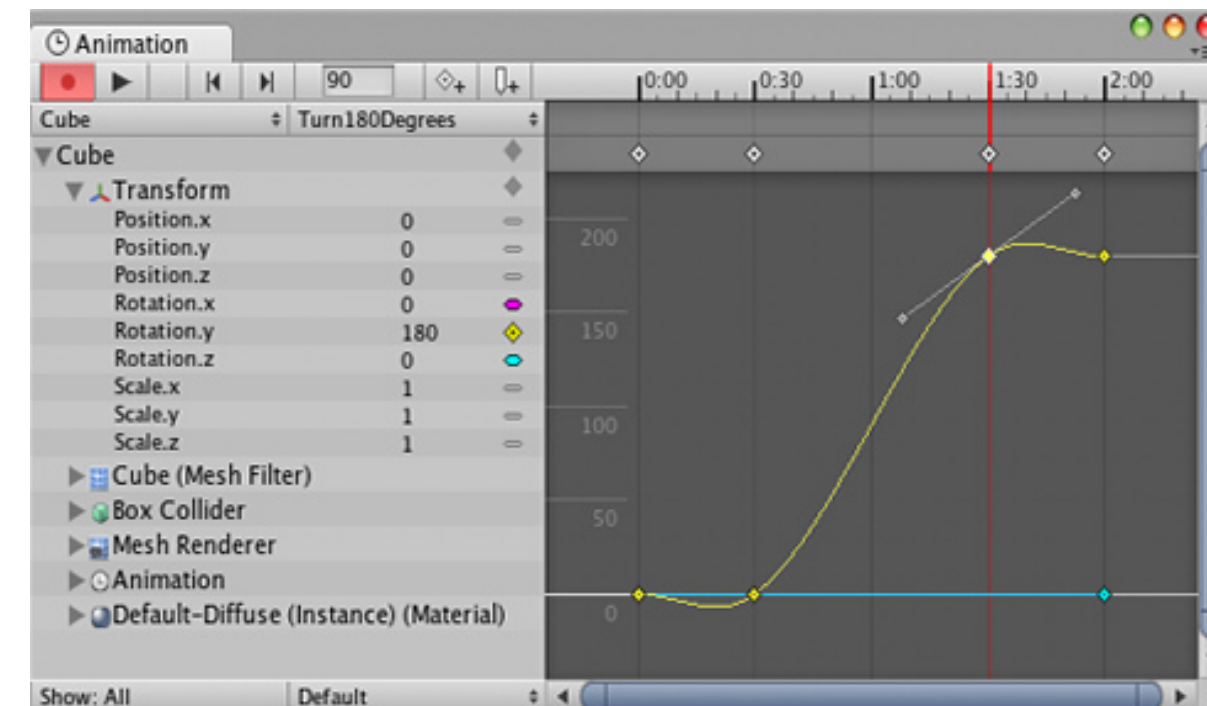
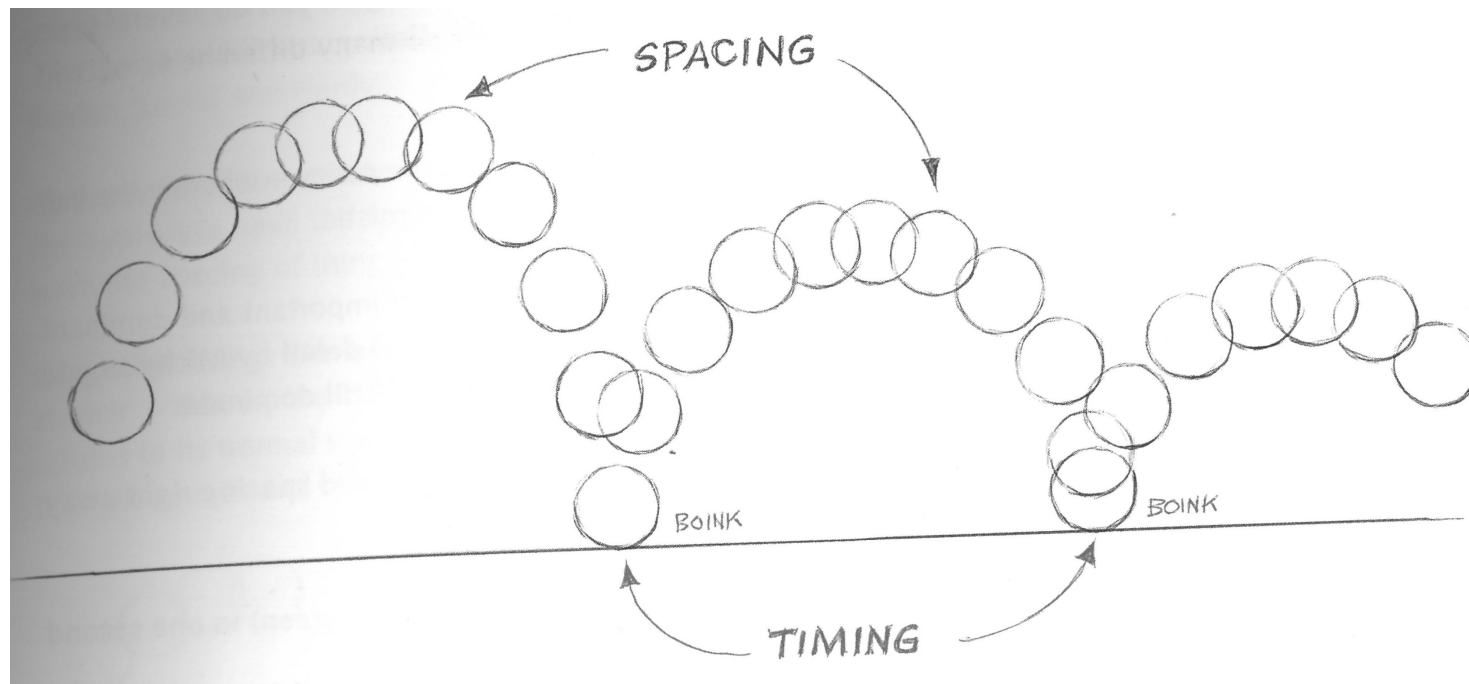
*Linked to geometric **character deformation**, time is not involved*



2- **Animating** the in-betweens

- **Timing** : Place key frames at specific times (global length of an action)

- **Spacing** : Speed of the interpolation (dynamic of the action)



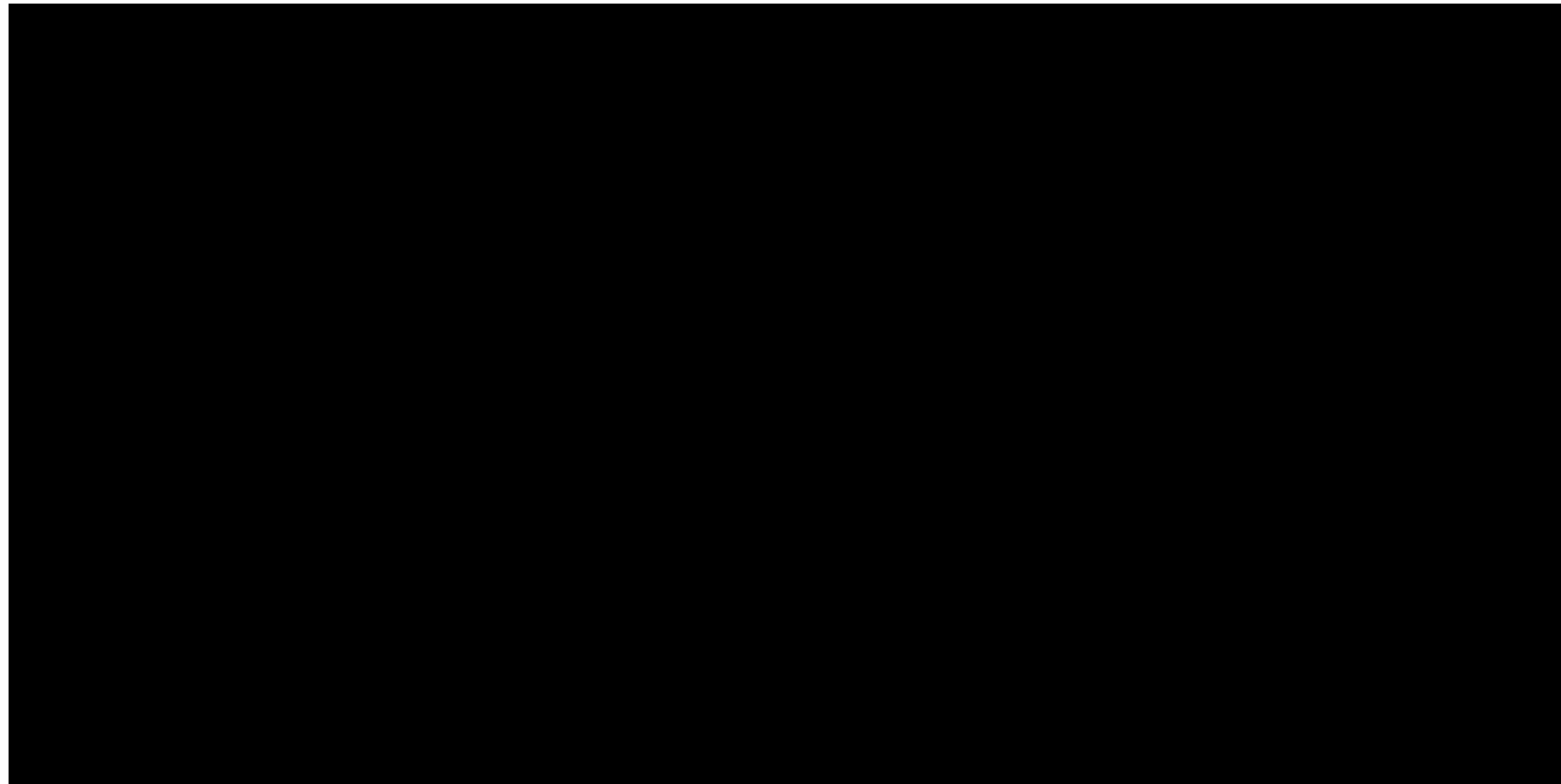
Special Effects (VFX)

Everything which is not handled by traditionnal modeling/rigging/animation

Physics (explosion, fluids, dynamic hairs, cloth, ...), particles systems, complex shape, crowd, etc.

Technical R&D part: One element can lead to the development of a dedicated system.

Main software: Houdini (SideFX)



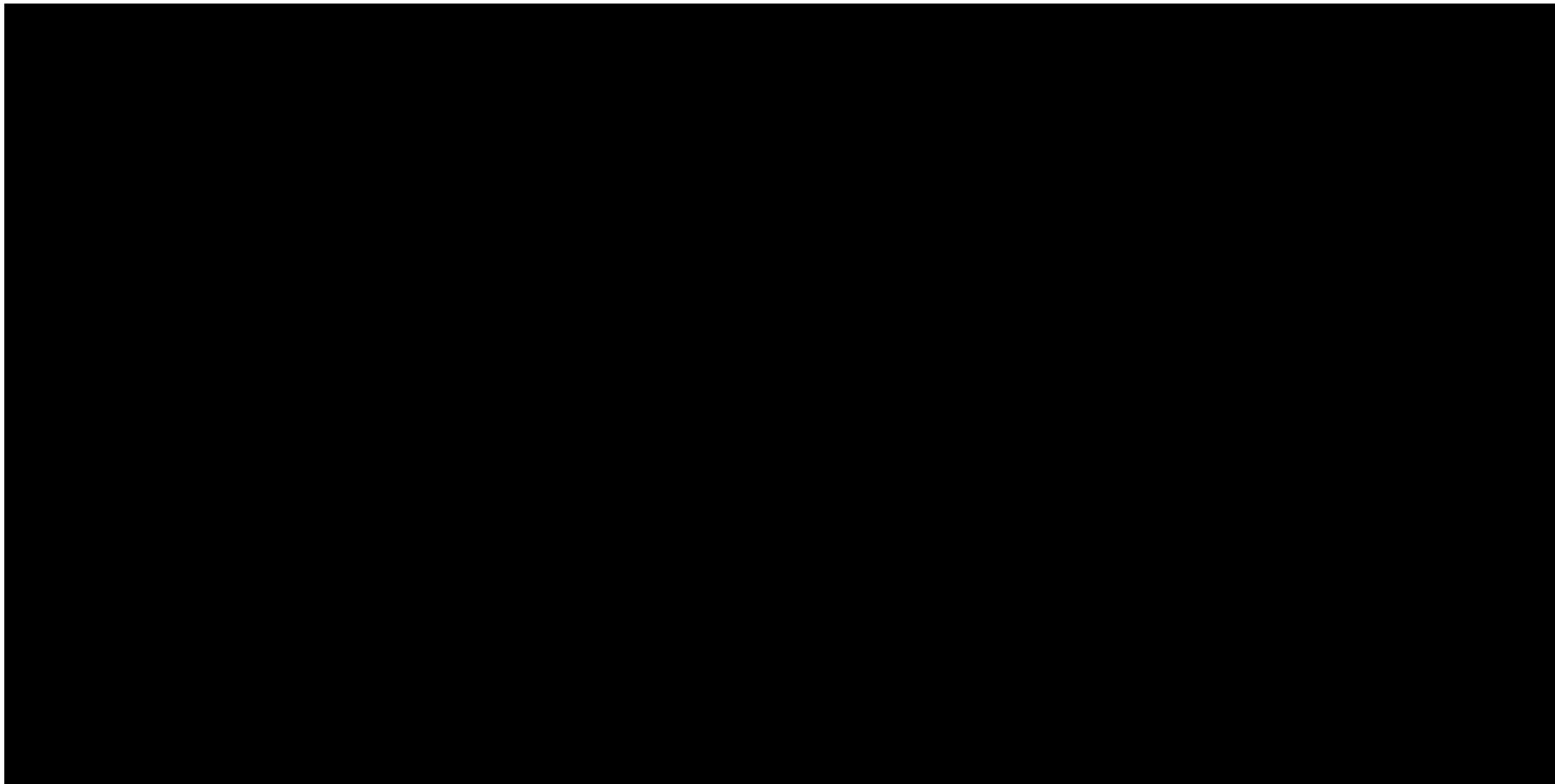
Post Production

Compositing

Blend all layers: Rendered and real ones

Note: Rendering of color layers but also depth and normals.

Main software: Nuke (Foundry)

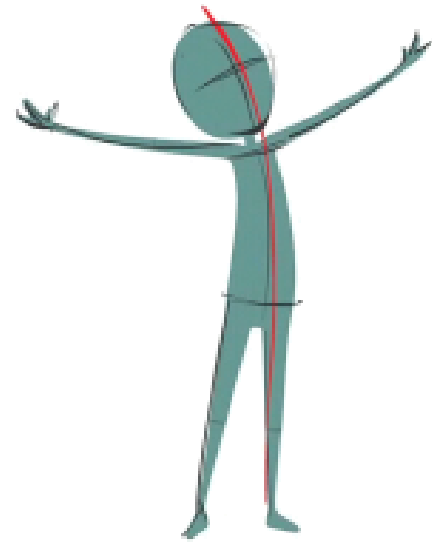


Expressive Animation

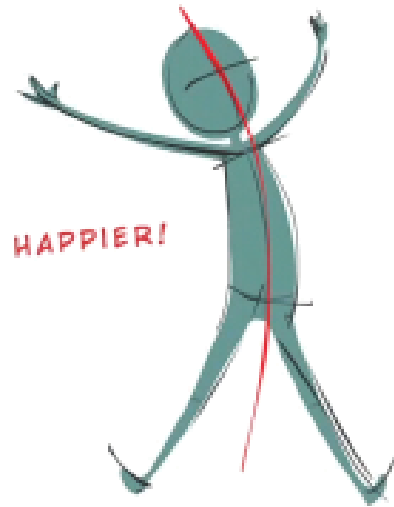
Character Animation Posing - Line of Action

- Line of action: *Medial axis* expressing the character pose
- Express *statically* the dynamic of the action
 - Unstable pose $\Rightarrow$ Dynamic action/motion

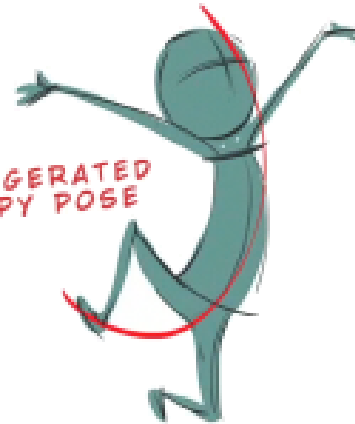
SLIGHT CURVE



HAPPIER!

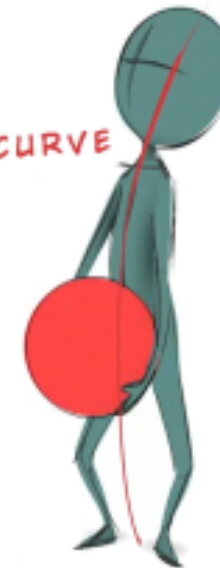


EXAGGERATED
HAPPY POSE



SLIGHT CURVE

SEEMS LIGHTER



EXAGGERATED EFFORT POSE

SEEMS HEAVIER

ACCENTUATED
CURVE



SLIGHT CURVE



ACCENTUATED
CURVE



EXAGGERATED
SAD POSE

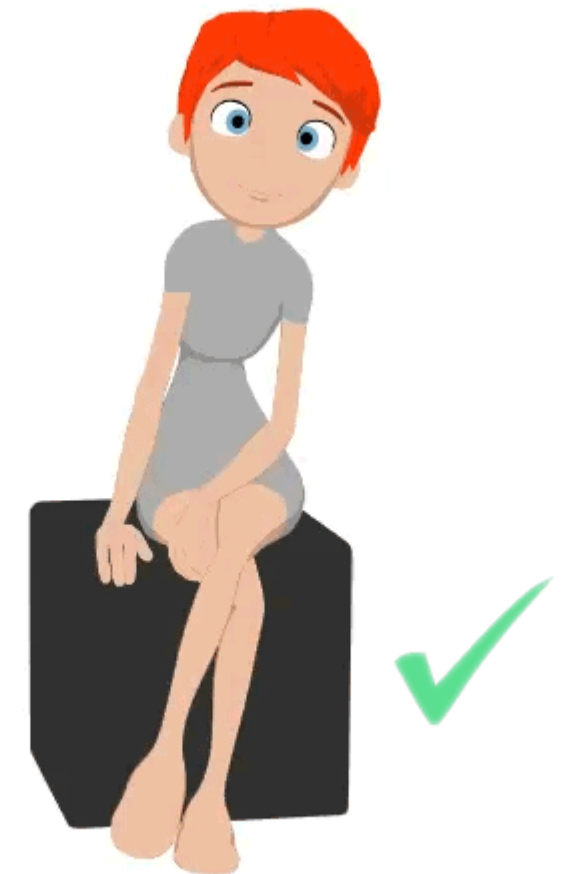
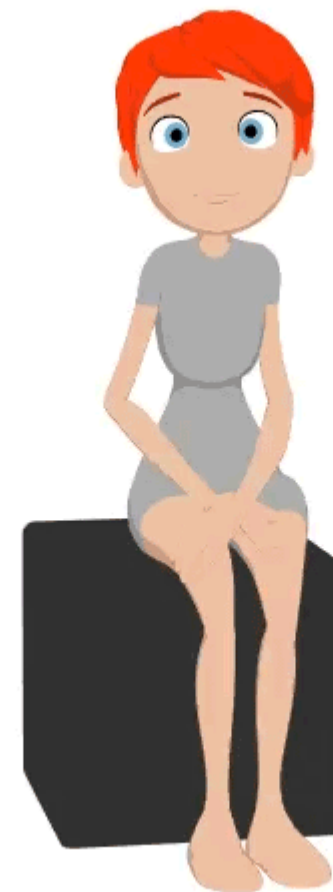


(C) Chiara Porri

Principles of animation

- Interpolation between realistic poses isn't enough for expressive animation
- *12 principles of animation* by Disney *Illusion of Life*, 1981

1. Timing
2. Spacing
3. Slow-in, Slow-out
4. Squash & Stretch
5. Anticipation
6. Follow Through
7. Secondary Action
8. Exaggeration
9. Appeal
10. Arcs
11. Staging
12. Straight Ahead/Pose to Pose

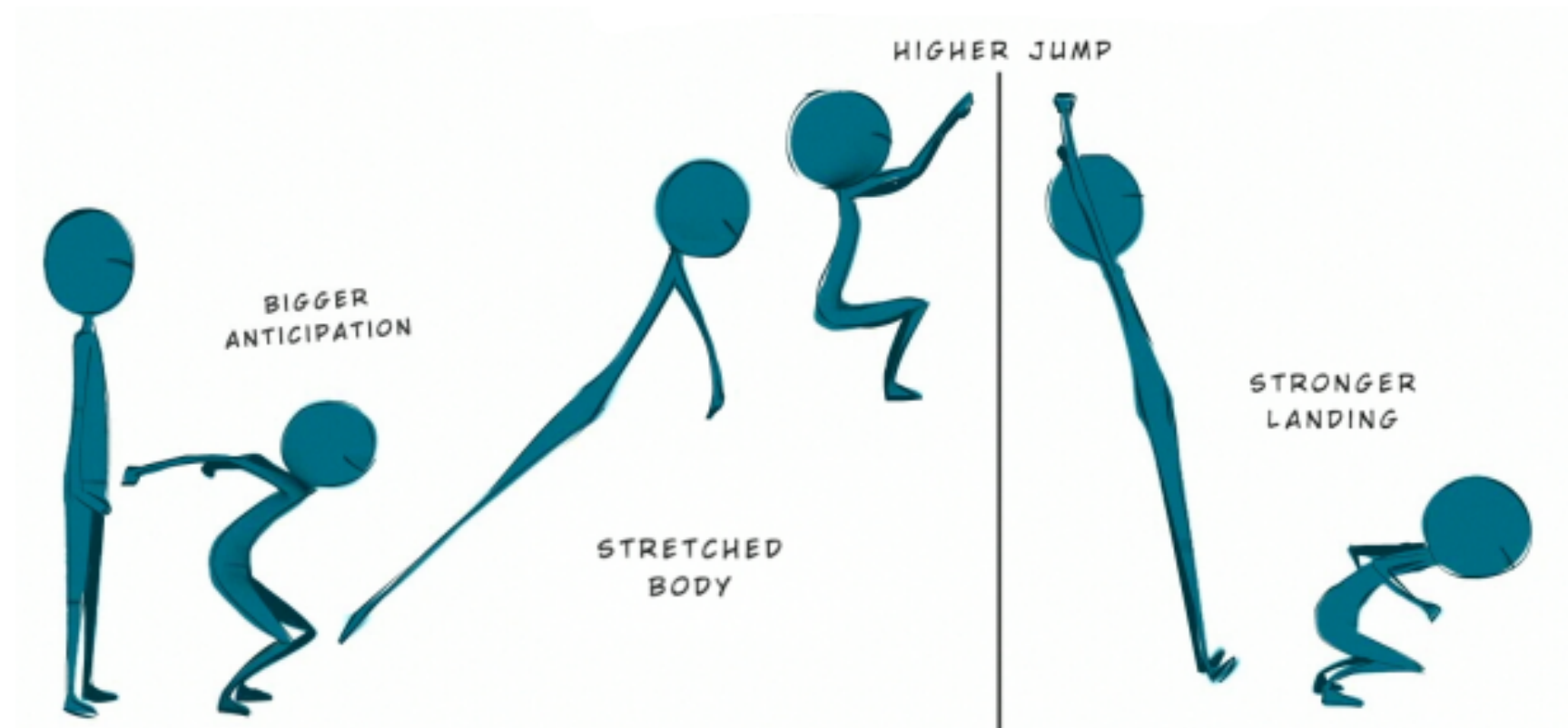
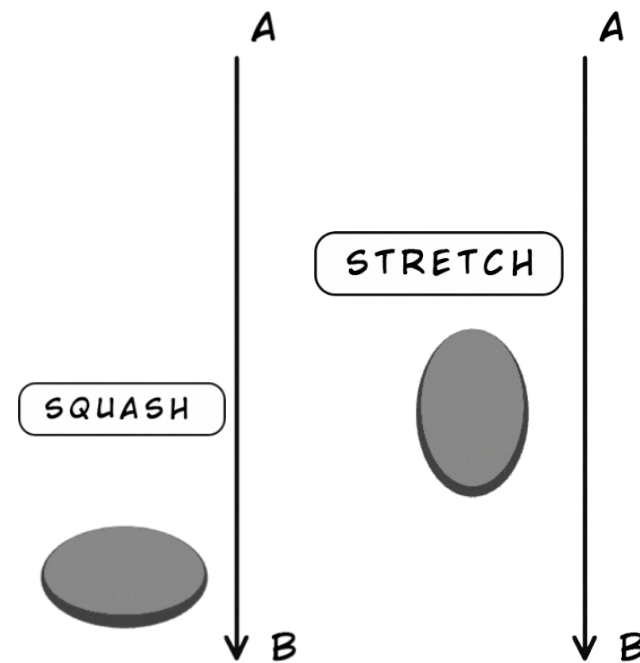


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Expressive animation

Squash & Stretch

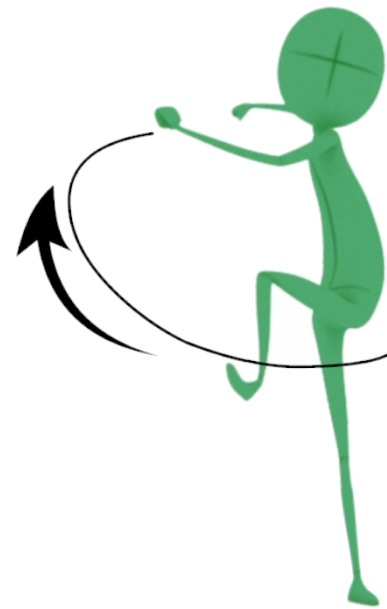
- Very common in cartoon
- Unrealistic, but surprisingly *plausible*



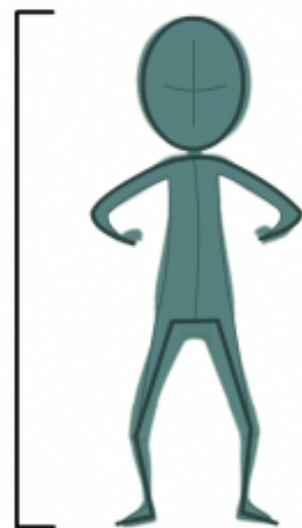
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Expressive animation

Anticipation

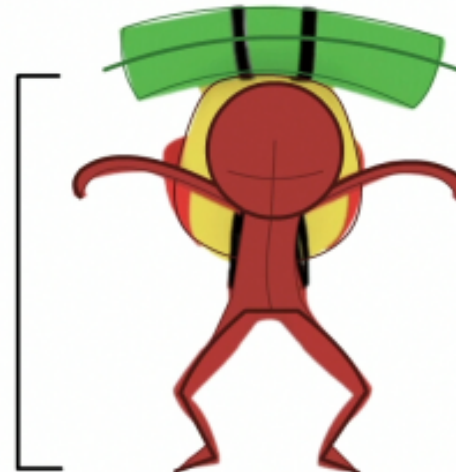


the character is pretty light



Softer Anticipation

the character is bringing
an heavy object

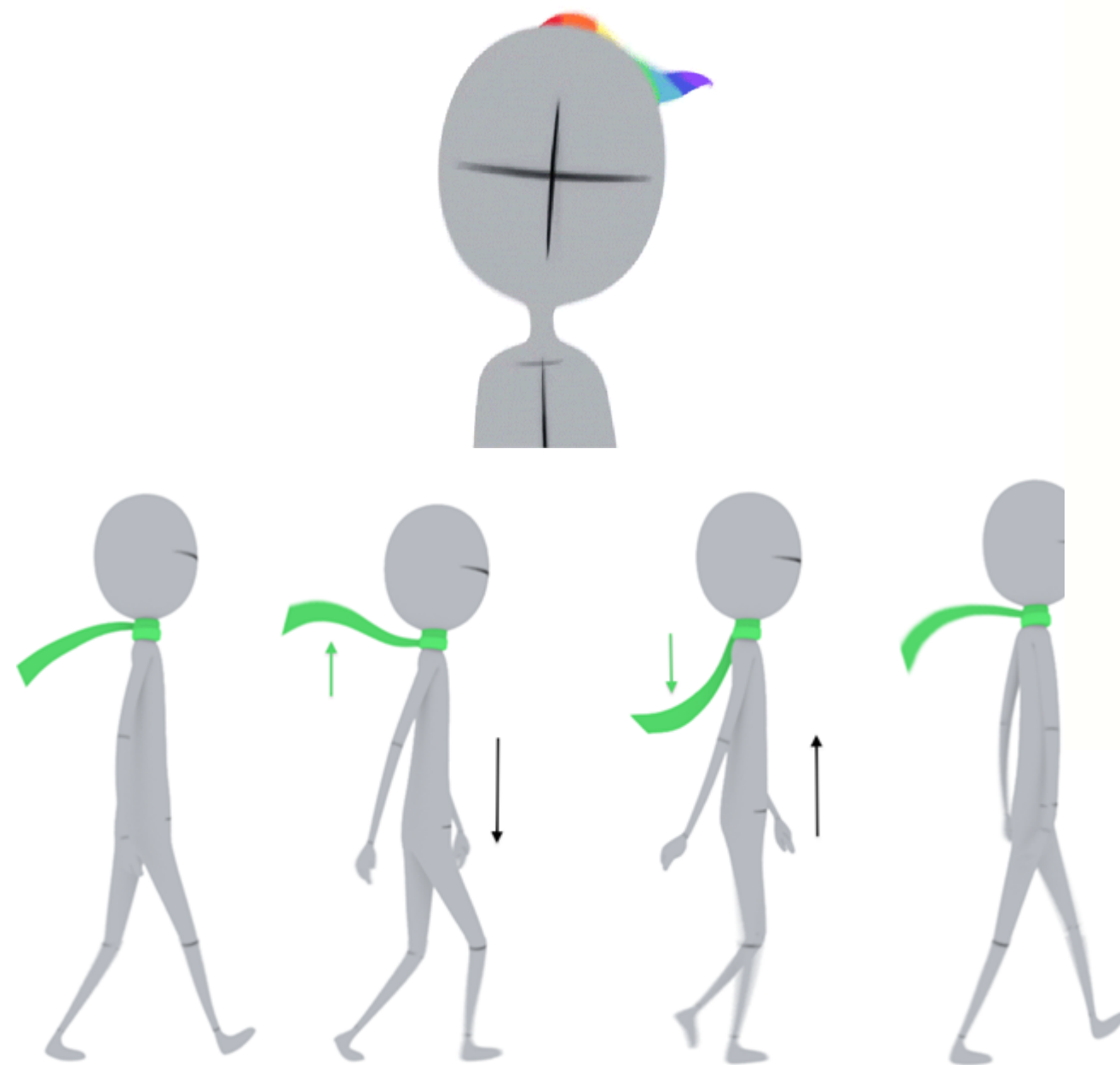
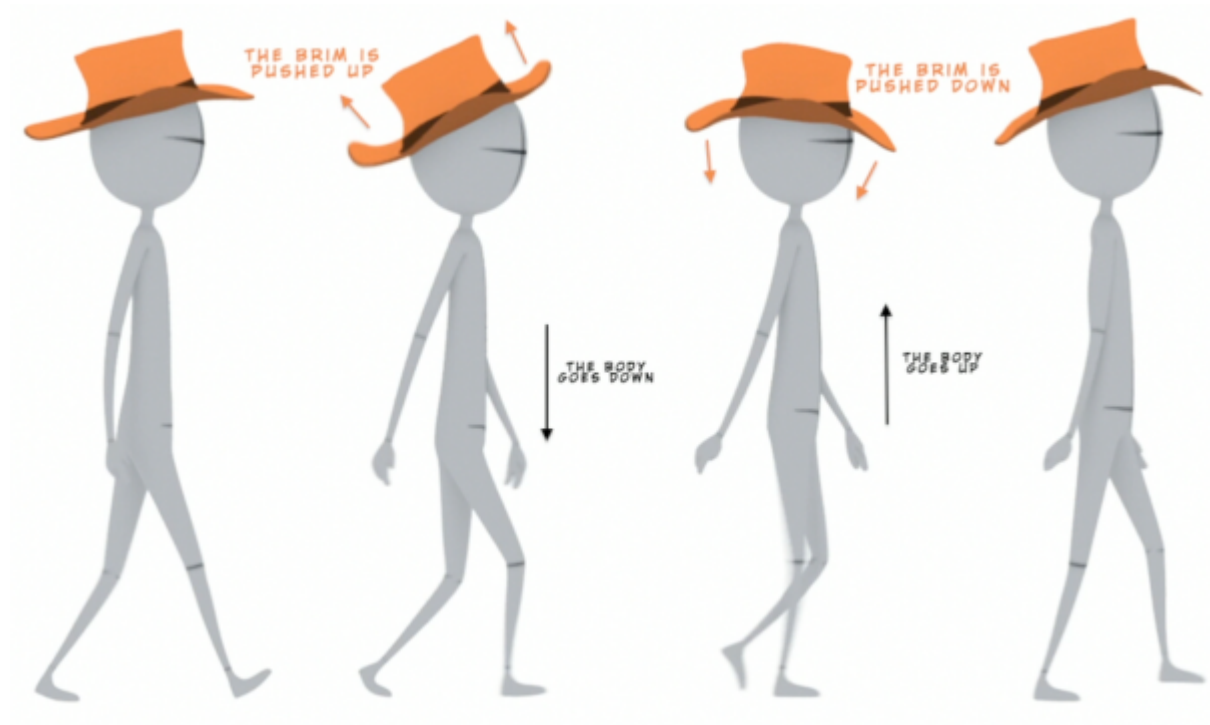


Stronger Anticipation



Expressive animation

Follow Through / Secondary motions



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