Production Pipeline

Case of Animation Cinema production

Production Pipeline

Fundamental structure for VFX/animation movie production.

Pre-production

Story, script,
concept art

Storyboard

Animatic

Production

Layout

Special Effects

Modeling

Rigging

Shading

Texturing

Lighting

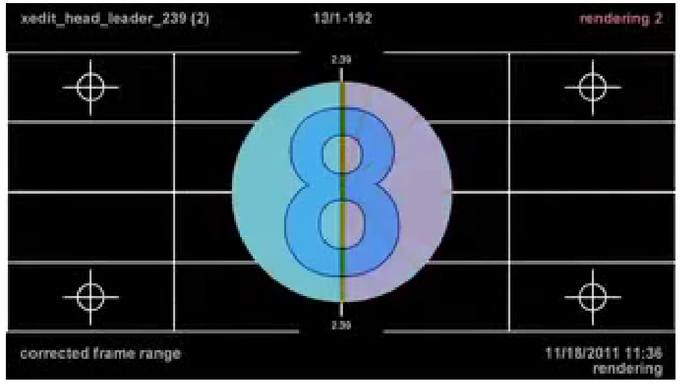
Animation

Rendering

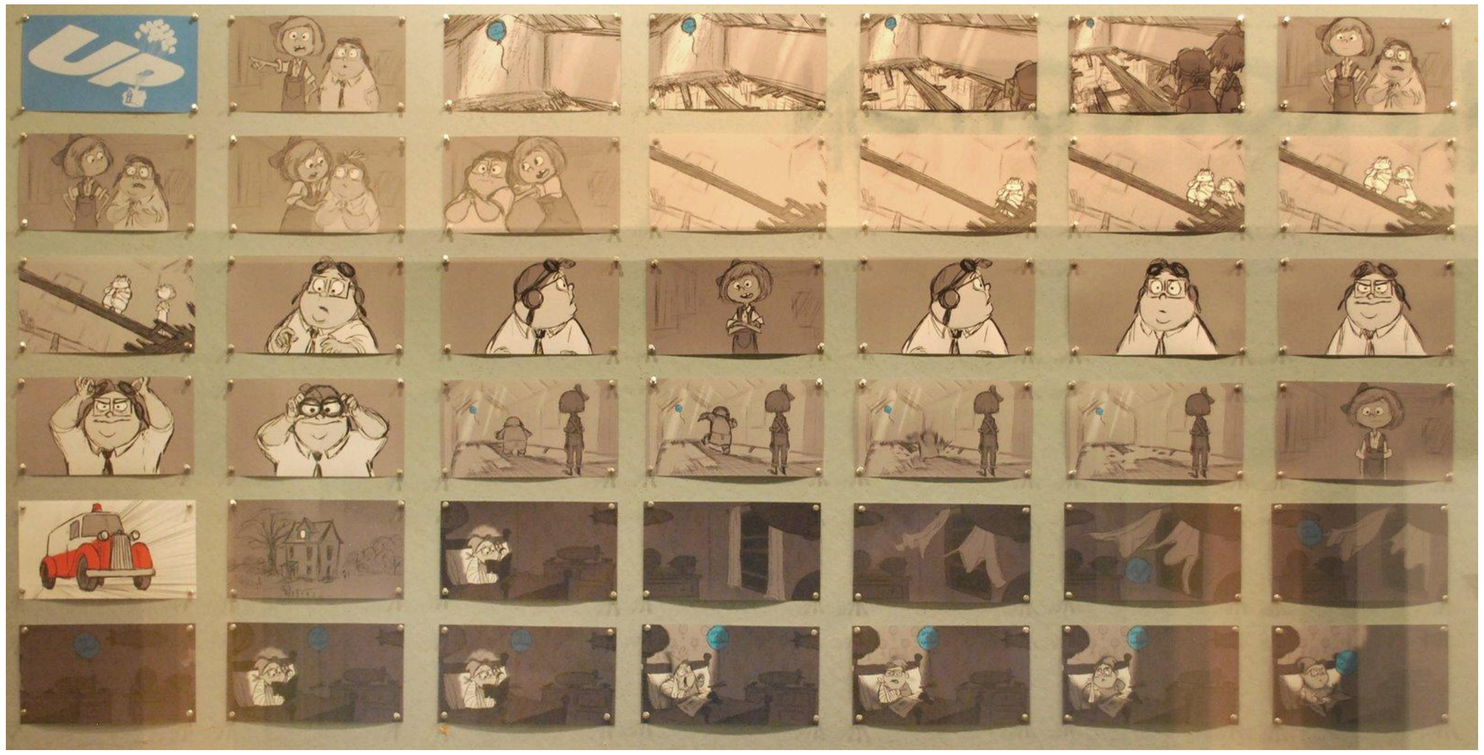
Post-Production

Compositing

Editing



Story-board



Few 2D drawings: express the story

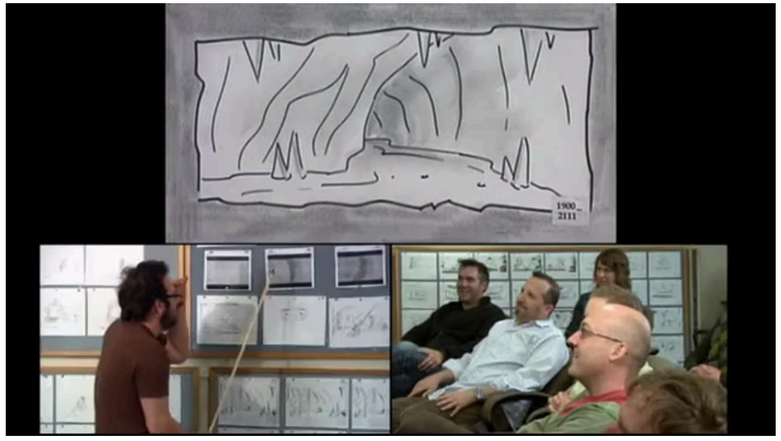
Before mostly non-technical - artistic/creative based
Curently increase of Storytelling-related researchs in CG

ex. *Disney Research Studios*

Animatic

$\simeq$ 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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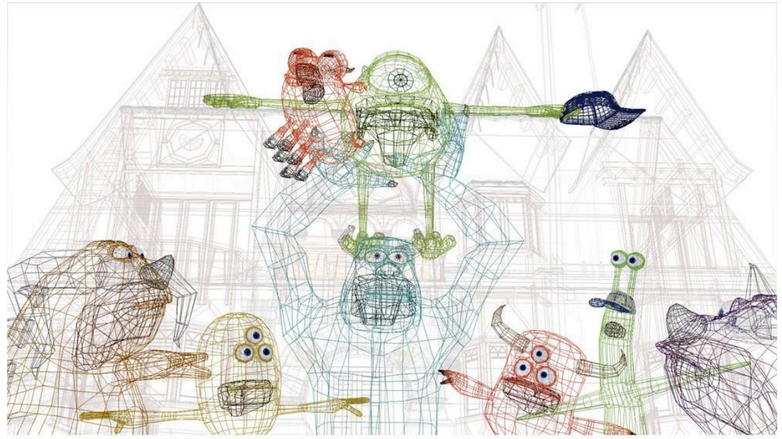

"MONSTERS UNIVERSITY" Progression Image 3 of 6: MODELING
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"MONSTERS UNIVERSITY" Progression Image 4 of 6: LAYOUT
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3D Modeling

In production

- Polygonal mesh modeling

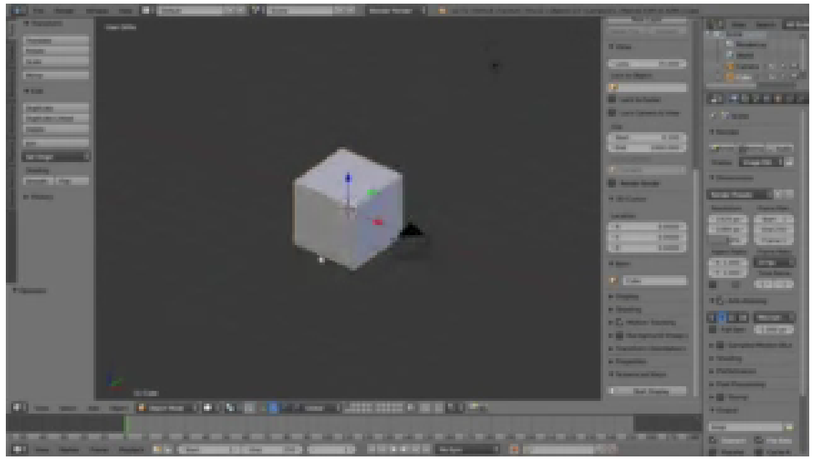
  Coarse to fine approach

  1. Low res modeling (extrusion)

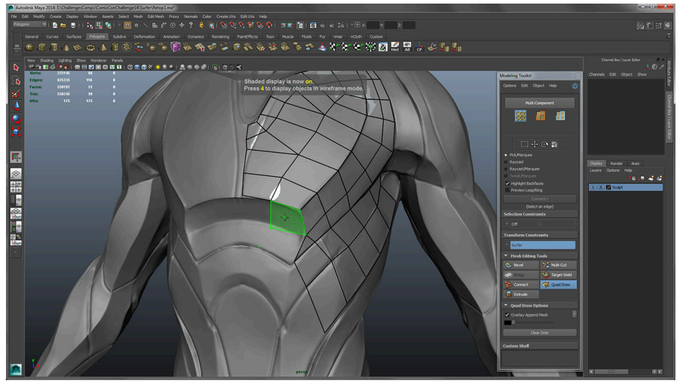
  2. Subdivide, Refine

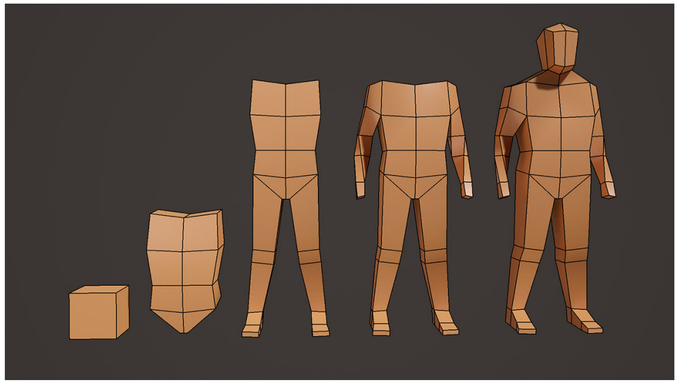
- Parametric (NURBS) modeling

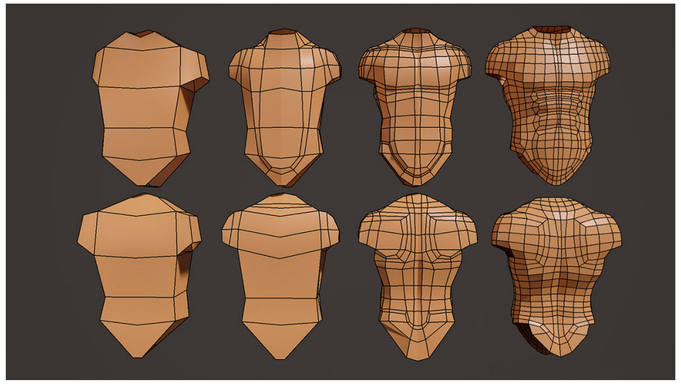
Everything else is "VFX"



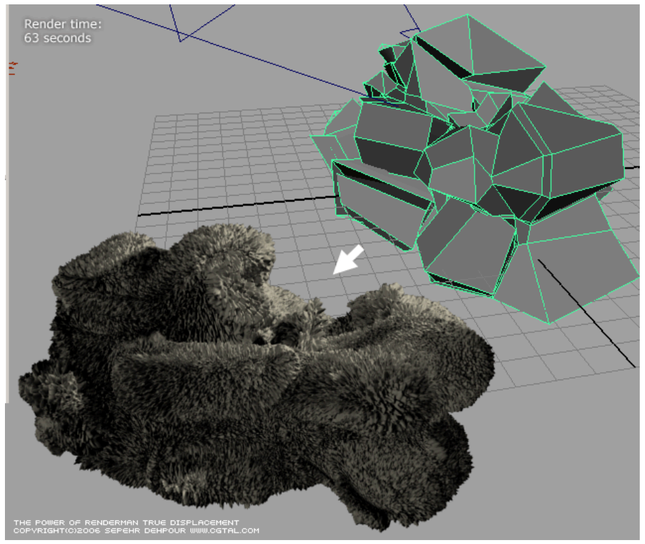
Common tools: Maya, 3DSMax, Cinema4D, Blender, etc.



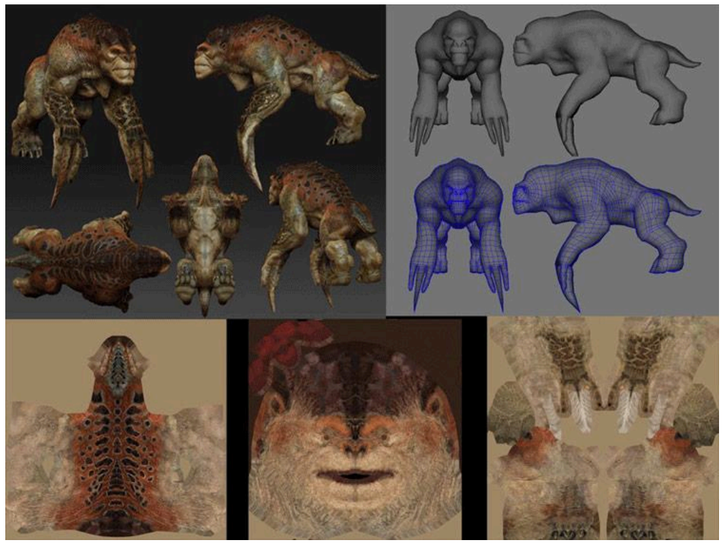




Modeling appearance - Rendering purpose

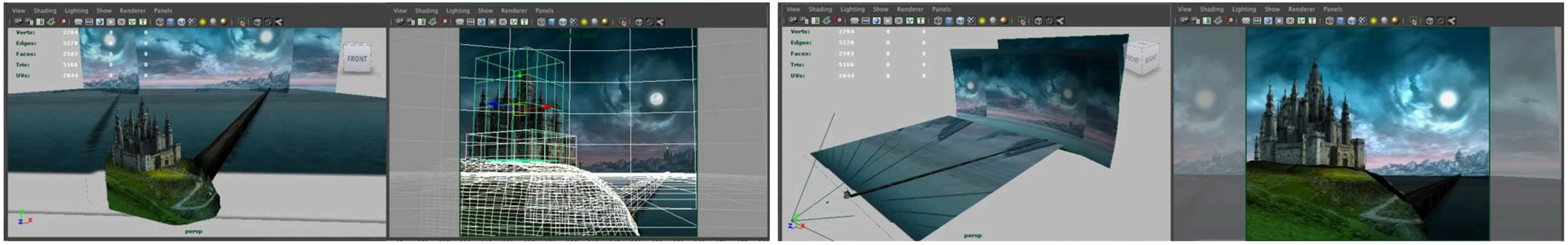


Shading



Texturing

Lighting



Mate painting

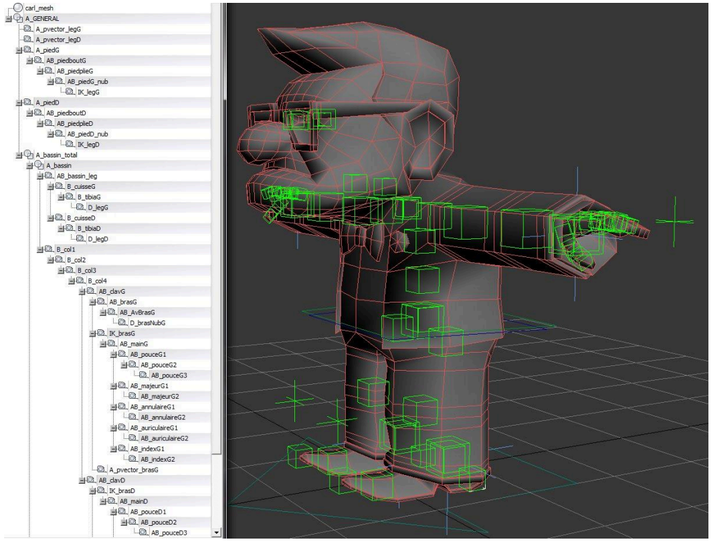
Rigging

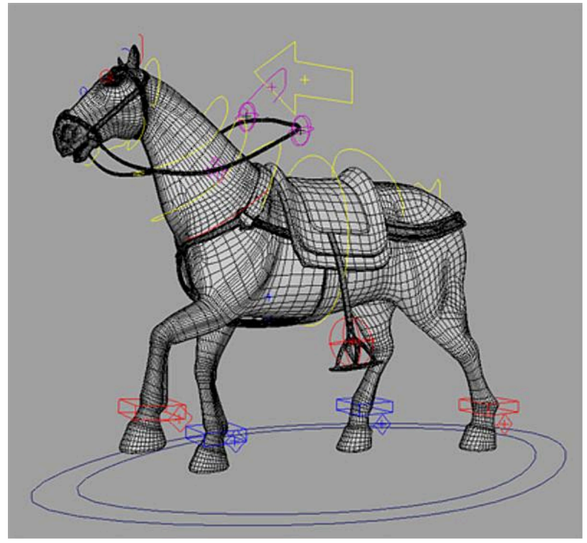
Attach deformation handles to the mesh

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 (×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

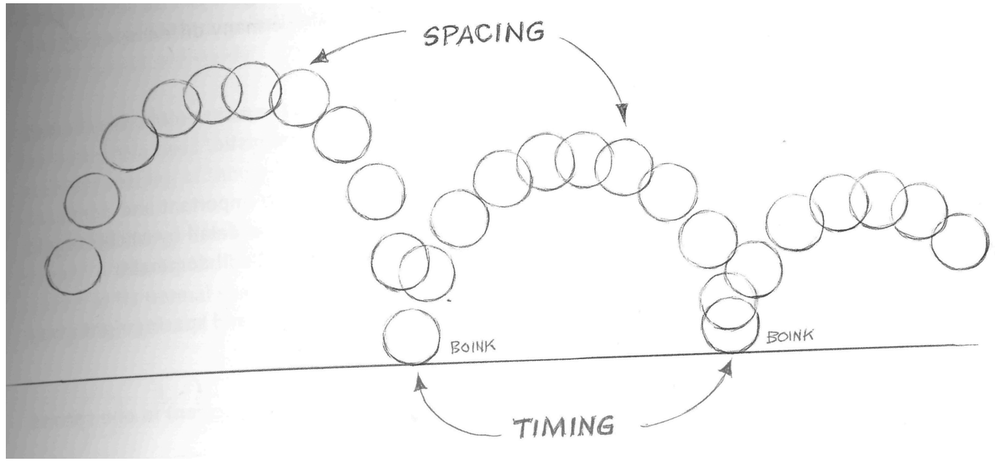
1- **Posing** the *key frames*

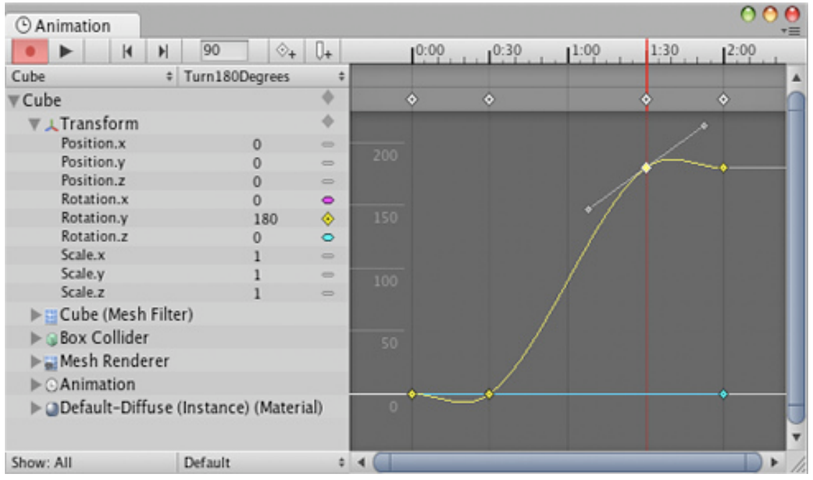
Set the main general posture of the character

*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

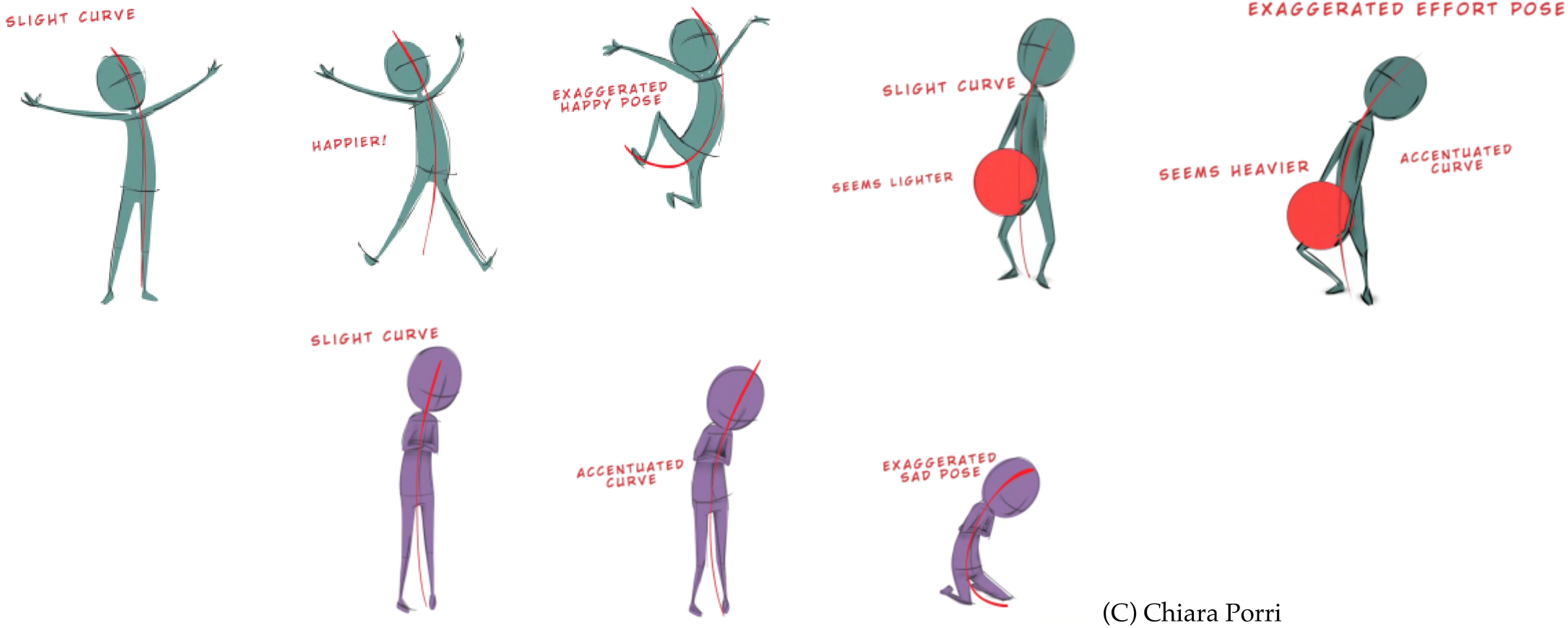
Note: Rendering of color layers but also depth and normals.

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 ⇒ Dynamic action/motion



Principles of animation

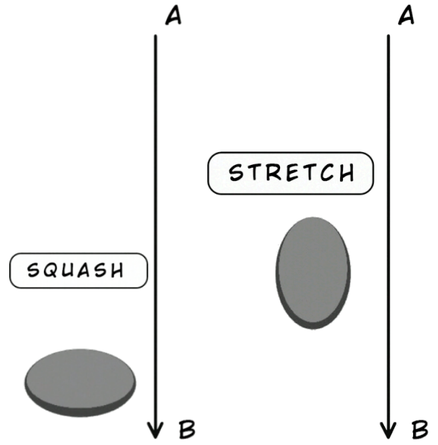
- Interpolation between realistic poses isn't enough for expressive animation
- *12 principles of animation* by Disney *Illusion of Life, 1981*

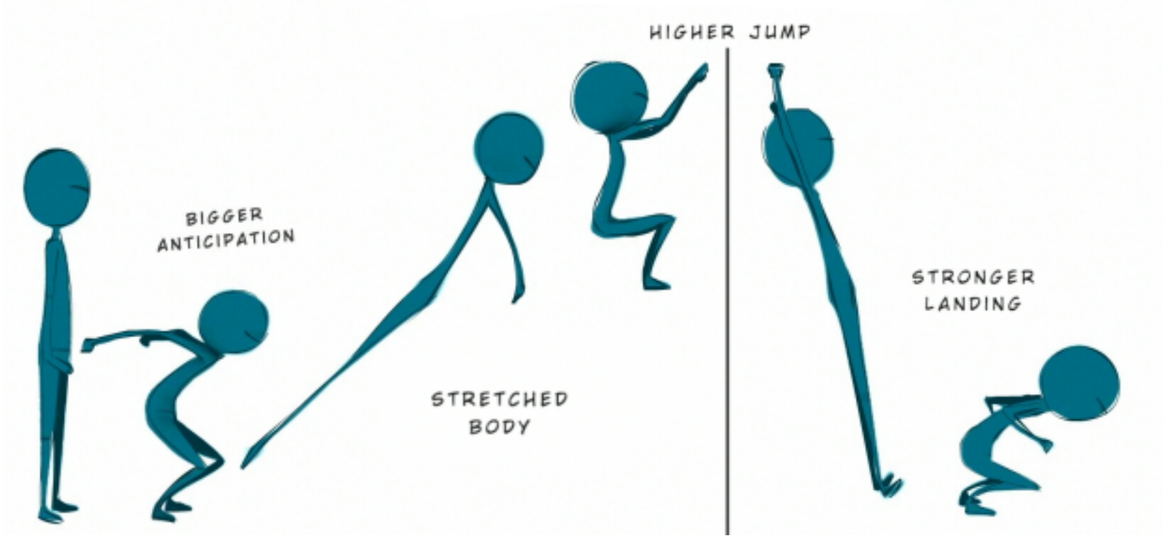
1. Timing
2. Spacing
3. Slow-in, Slow-out
4. Squash & Stretch
5. Anticipation
6. Follow Through
7. Secondary Action
8. Exaggeration
9. Appeal
10. Arcs
11. Staging
12. Straight Ahead / Pose to Pose

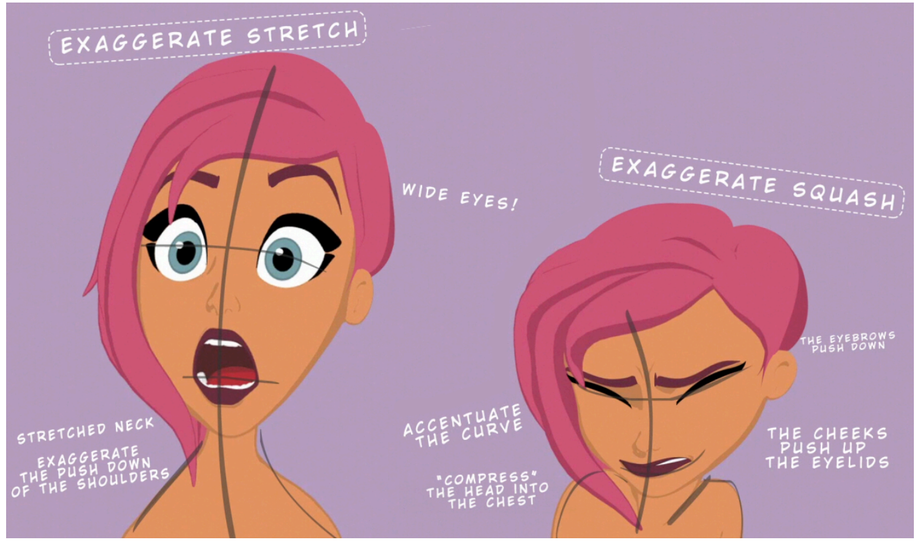
Expressive animation

Squash & Stretch

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



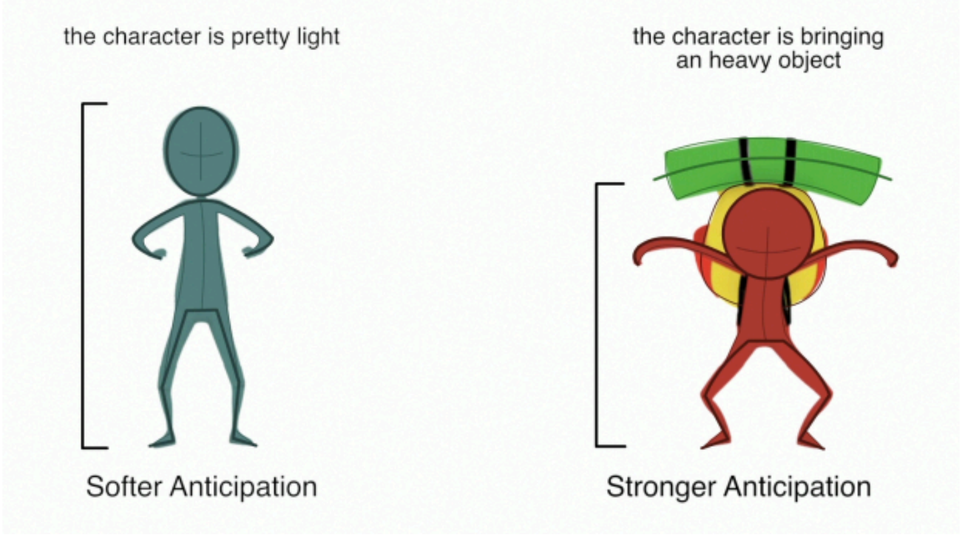




(C) Chiara Porri

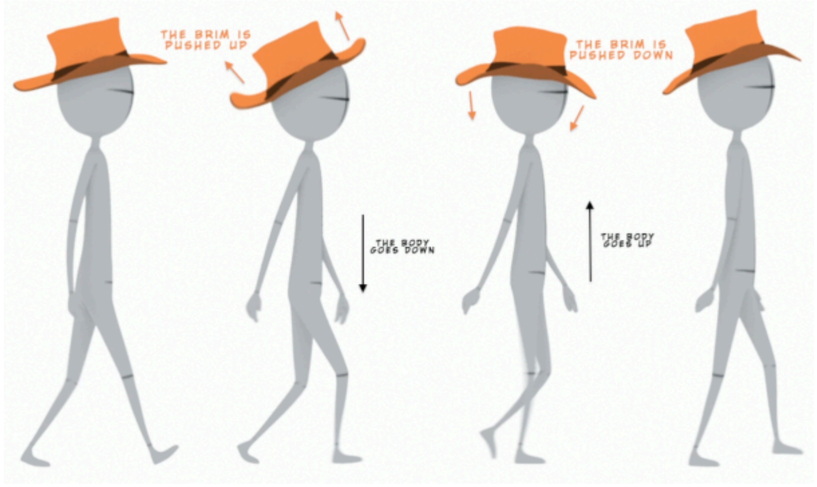
Expressive animation

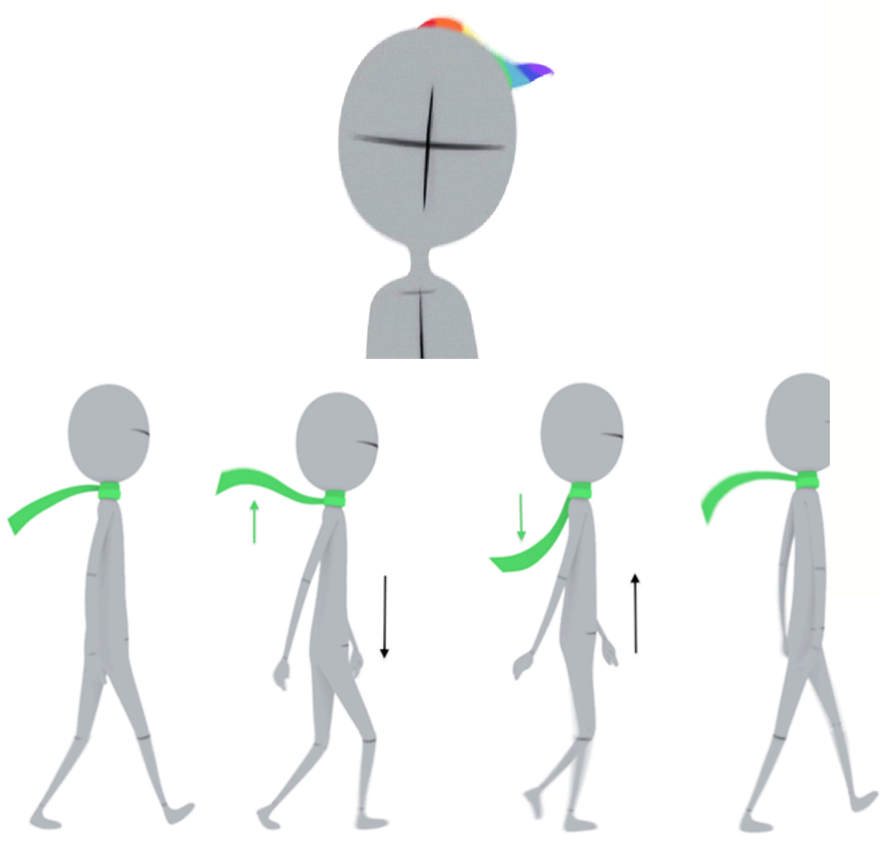
Anticipation



Expressive animation

Follow Through / Secondary motions





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