

Towards a visual language for animated paintings



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Context



Each frame of animation is a painting.

→ Super **time consuming** to do by hand.

Goal

Provide tools to artists to help with <u>tedious</u> tasks

La Traversée, Florence Mialhe (Les Films de l'Arlequin)

Outline

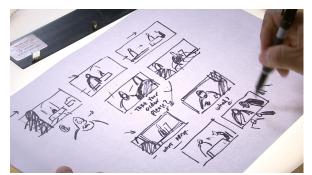
Introduction

- What does animate mean?
- The Visual language in Motion
- Stroke advection using motion field

Conclusion & Discussion

Part I: What does *animate* mean?

Animation movie : Making off



Storyboard of Ratatouille (Pixar Animation studio)



Traces, Hugo Frassetto & Sophie Tavert-Macian (2019)



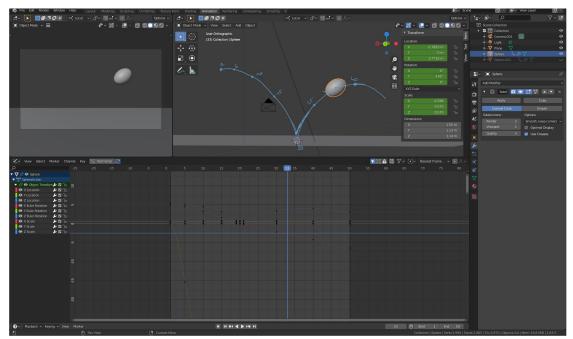
Concept art of Coco (Pixar Animation studio)

- Prepared similarly to live-action movies
 - o Organisation in sequences, scenes
 - Storyboard, animatics, concept arts..

• Output : a series of images (*frames* of animation) creating an illusion of <u>motion</u>

Animate as designing deformations

Virtual 3D animation



Blender Software

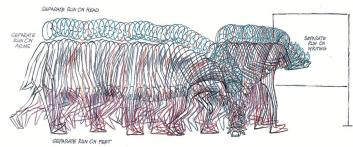
- Scene content defined independently from the motion
- Animation curves allow to experiment and refine motion



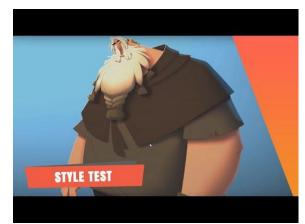
Soul, Pixar (2020)

Animate as combining images

Most 2D animation: cartoons, paint on cell, paintover..



the Animator's Survival Kit, Richard Williams (2001)



Klaus, Sergio Pablos (2019) -- logiciel: les Films du Poisson Rouge



Blinkity Blank, Norman McLaren (1955)

- Each image is created independently
- Motion is implied by the small variations between each image
- Time consuming ++

Animate as moving stuff

Stop motion techniques: puppets, paint on glass, sand animation...



Isle of Dogs, Wes Anderson (2018)



The Book of Speculation trailer, Linn Tomlinson (2015)



Traces, Hugo Frassetto & Sophie Tavert-Macian (2019)

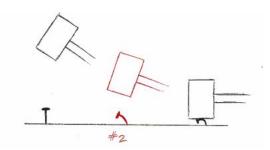
- Take shots of the evolving state of an existing scene
- Motion is directly made by the gesture of the artist

Destructive method

Where do we stand?

• Stroke-based 2D animation

- Some leads :
 - o Impulse motion in a painting
 - Inbetweening of stroke-based frames
 - Copy/Paste with variations



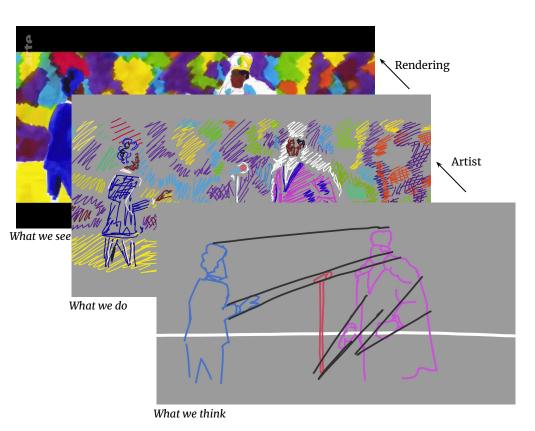
The Animator's Survival Kit, Richard Williams (2001)



And then the bear, Agnes Patron (2020)

Part II: The Visual language in Motion

Static visual language



Scales of analysis

Image (pixel)

Gradients, color histograms..

• Painting (strokes)

Curvature, length, order of the strokes..

• Representation (composition)

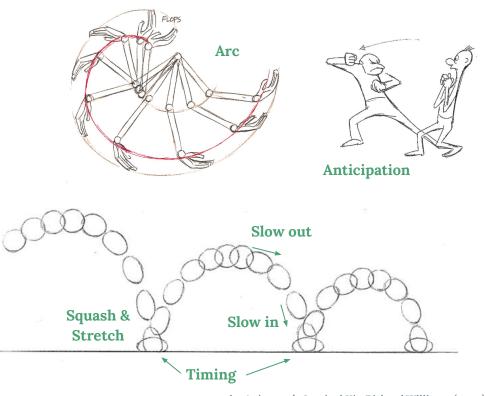
Relative location of elements, projection system, lights..

→ A good analysis combines all different scales

Animation principles

The 12 principles of animation [Thomas and Johnston 81]:

- Squash & stretch
- Anticipation
- Staging
- Straight ahead & Pose-to-Pose action
- Follow through and Overlapping action
- Slow in & slow out
- Arc
- Secondary action
- Timing
- Exaggeration
- Solid Drawing
- Appeal



the Animator's Survival Kit, Richard Williams (2001)

[→] motion as <u>acting</u>: change in the representation

Other types of motion

• Change of focus / level of detail representation → strokes

Metamorphosis

Uncertain inbetween representation

• Faux-fixe

representation \rightarrow strokes

strokes -> image



The Book of Speculation trailer, Linn Tomlinson (2015)



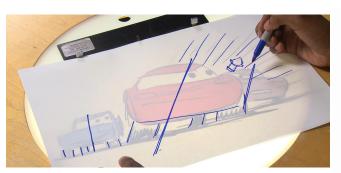
Me, by J-Money, Daniel Bruson (2018)

Line qualities

Lines are everywhere: strokes, arc trajectory, perspective, composition, line of action...

- Geometric features ..
 - curved/straight
 - o clear/uncertain
 - o quick/oscillating
 - o thin/thick

- .. expressing meaning
 - o smooth/rigid
 - strong/delicate
 - o calm/nervous
 - o light/angry







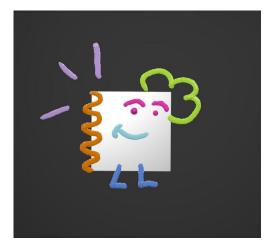
Pixar Animation Studio

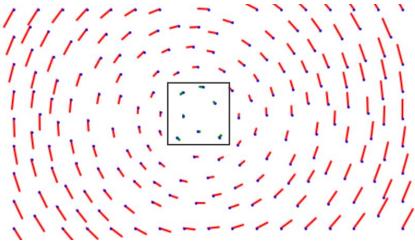
the Animator's Survival Kit, Richard Williams (2001)

Part III : Stroke advection using motion field

Stroke advection

- Underlying 3D animation
- 2D strokes are drawn on it
 - Each stroke has a radius, a color and a path
 - Path = series of 2D points + pressure
- 1 Frame = 1 motion field (from the 3D animation)
 - \Rightarrow point-by-point advection of each stroke
- Extension of the field using biharmonic interpolation





Limitations

- Loss of line qualities
- \Rightarrow need to redraw a curve, using the advection as a guide, and preserving initial line qualities.
 - Occlusions during the animation
- ⇒ back and forth workflow where the user can redraw/fix any frame
 - Extend to a full painting
- \Rightarrow stroke clustering and motion field segmentation

Conclusion and Discussion

Conclusion

- Like for images, there are various scales of analysis for motion, and animation
- Artists already have visual languages to express their ideas
- A difficulty is to manage the balance between the automation and the freedom we leave to the artist
 - → let the artist work with the tool, not against it

Merci

de votre attention

References

Articles

- An invitation to discuss computer depiction, Durand 2004
- Defining Pictorial Style: Lessons from linguistics and CG, Willats et Durand 2005
- Non-photorealistic rendering and the science of art, Hertzmann 2018
- 2D artistic image analysis : a content-based survey, Hurtut 2010
- Interactive NPAR : what type of tools should we create ? Isenberg 2016
- Putting the artist in the loop, Seims 1999

Books

- Ecoles, genres et mouvements au cinéma, Vincent Pinel 2000
- La Peinture animée, entre peinture et cinéma, Stefanie Varela 2009 (Thesis)
- Le Cinéma d'animation Techniques, esthétiques, imaginaires, Sébastien Denis 2017
- The Illusion of Life, Thomas et Johnston 1981
- The Animator's Survival Kit, Richard Williams 2001
- Le Langages des Lignes, Marcel Jean 1995

Summary

	2D animation	3D virtual	Stop Motion
Workflows:			
Straight Ahead	✓	×	V
Pose-to-Pose	V	V	×
Motion	Variations in images	Animation curves	Artist gesture
Output	Images	Renderings	Photos
Regenerative	V	V	×
Camera and viewpoint	Implicit	Explicit	Explicit or Combined

Note: Live animation, such as puppet shows, and/or live painting are out of the scope of this presentation