

Principles of Animation Applied to Design

Making Meaningful Causalities that are Clear, Believable, and Engaging

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ABSTRACT

Can designers learn something from the tradition of animation? Both animators and designers can be seen as making causalities with meaning. By analyzing the traditional principles of animation, it was revealed that they made the animation clearer, more believable, and more engaging. Therefor this paper will show that one lesson designers can learn from animation is that they both should aim to create meaningful causalities that are clear, believable and engaging.

KEYWORDS: Animation, Principles of animation, Design, Methods, Story

1. INTRODUCTION

Both Disney and Pixar are famous for their quality animated features that have captures the heart of the audience. Can designers learn something from the animators behind these films that can be used to create better design?

Before Disney's animators could make "Snow White and the Seven Dwarfs"(Hand et al. 1937) they needed to figure out how to make the animation good enough to meet Walt Disney's high standards. The animators eventually found some techniques they could use to improve the scene and motion. These techniques ended up as the fundamental principles of animation, rules of trades that are used by animators even today. (Thomas and Johnston 1995, Lasseter 1987) This paper will delve into how these principles enhance the animation, and question if good design can be improved in a similar manner.

The paper will first look at the background for the principles of animation, before it will explain how the effect of the principles on the animation can

be seen as creating clear believable and engaging causalities with meaning.

After establishing an interpretation of how the principles work, it is time to see if it is applicable to design. There are several uses for animation for designers. It can be found as a tool for testing new concepts with simulations, for sharing information and explanations, in the making of GUIs (Baecker and Small 1990, Mirlacher, Palanque, and Bernhaupt 2012, Wang, Juhlin, and Johnson 2014). However, this paper is not about how designers can use animation, but rather what designers can learn from animation.

The paper will show that both animators and designers will benefit working with the aim of creating meaningful causalities that are clear, believable, and engaging.

2. THE BACKGROUND FOR THE PRINCIPLES OF ANIMATION

The principles of animation were created in the period between the late 1920s and the late 1930s. The animators at Walt Disney studio were working hard to refine their animation, since Walt Disney demanded better animation from them. Disney needed improvement to meet his visions so he could tell the story he wanted. He needed convincing movement that could bring the characters to life so that the audience would get involved and care about the story. (Thomas and Johnston 1995)

To meet Walt Disney's standards the animators started exploring how they could improve their motion. They experimented with various techniques; they shot movies of motion that were studied repeatedly, and they shared and discussed their findings. Eventually they gave names to the most successful processes and perfected them until they had 12 fundamental principles of animation (Thomas 1984, Thomas and Johnston 1995, Lasseter 1987):

1. Squash and Stretch
2. Anticipation
3. Staging
4. Straight Ahead Action and Pose-To-Pose
5. Follow Through and Overlapping Action
6. Slow In and Slow Out
7. Arcs
8. Secondary Action
9. Timing
10. Exaggeration
11. Solid drawing
12. Appeal

The paper will come back to these principles in more details, when it discusses their effect on animation.

Thanks to these principles Walt Disney was able to produce his first animated feature film "Snow White and the Seven Dwarfs" which became a great success. Later these principles have become a standard in the animation industry,

and brought along as animation has moved to 3D animation (Lasseter 1987), interactive games (Tomlinson 2005), and interfaces (Chang and Ungar 1993).

3. THE ANIMATION AND THE PRINCIPLES

To understand what role the principles plays in creating good animations, an understanding of animation needs to be established. The word animation comes from Latin from animare which means 'instill with life'. Animation uses a sequence to create the illusion of motion. (Animation, URL) The animation that Disney created can also be seen as stories told through pictures.

3.1 Animation need a meaning

Animation like any good story need a meaning. In his book "Invisible Ink" McDonald writes about how a story needs a point, a reason to be told, and that this is what gives a story resonance with the audience. McDonald calls this concept an armature meaning the idea that the story is built upon. Everything in the story is there to enforce this idea to the receiver. The meaning of a story doesn't need to be spelled out, like the moral of a fable, but should be the feeling the audience is left with after the story has been told. It is possible to make some animation with just motion without much deeper meaning, however without any clear point the animation becomes shallow and will not stick with the audience. (McDonald 2010).

3.2 Animation consist of causalities

The animation can be said to be made of causalities, both in an overall arc of the story and in every motion that the pictures creates.

A story typically has a start, middle and end. In his book, McDonald (2010) presents seven steps to a better story. These seven steps is about how to create the start, middle and end of the story,

so that the story has a good and coherent causality.

The start of the story should present to the audience everything they need to know to understand the story that is to follow, like the main character, where the story takes place and what the current situation is. The setup in the beginning is essential for the rest of the story, and often when the audience feels like there is something off at the end; it was because something was missing in the setup.

In the main part of the story, something has happened to break the status quo that was established in the beginning, and a chain of events follows. One thing leads to another, and the story unfolds.

At the end of the stories is the last chain of events leading up to the climax. Following the climax the story needs to be rounded off. This can be done with a denouncement about how the story's causalities affected the world, or if the protagonists lived happily ever after.

In addition to the causalities that drives the story forward, each and every motion in the animation has their own causality. Animation can give visual cues to help the viewer understand what is happening before during and after an action (Chang and Ungar 1993). Several of the principles of animation are about this causality. Anticipation helps prepare the audience for the next action. A character can look at a pit before bending down making him- or herself ready for a jump over the pit. Follow through and overlapping is about how in a moving system like a body, the different parts does not start and stops their motion at the same time, the hair might still be moving after the head has arrived to its destination. Secondary action is about how an action of one object result in an action of another object, i.e. a character can push a class so it falls down from the table. (Thomas and Johnston 1995, Williams 2009)

3.3 The principles makes it clear

If a good animation can be said to consist of causalities with meaning, the principles of animation are used to enhance this. One way they do this are by making sure an idea or action is unmistakably clear. The audience's eye must be led to exactly where it needs to be at the right moment, so they do not miss the idea or action (Lasseter 2001).

The principle of staging is all about presenting the idea so that it is complete and unmistakable. This is a very general principle that stems from theater. Everything be it an action, personality, mood or expression needs to be shown in a manner that makes the audience aware and affected by it. How everything is framed plays a huge role in how well it can be understood, and everything should be done considering how to promote the point of the story. (Thomas and Johnston 1995)

In addition to staging there are other of the principles that help make the animation clearer. Anticipation helps grab the audience's eye and prepare them for the action, however if it is not timed properly it will be wasted (Lasseter 2001)

Exaggeration on the other hand is about emphasizing the idea. Going to the heart of something and develop its essence. Exaggeration work like a caricature that emphasize the important bits and downplay whatever that is less important. A caricature of a person can be faster and easier to read than a regular photo, using exaggeration can in this manner make the story clearer. (Thomas and Johnston 1995)

3.4 The principles makes it believable

The animators found the principles of exaggeration after Walt Disney asked for more realism in the animation again, and again. This realism was not copying a real motion, but make it convincing for the audience. At the same time it was important that the exaggeration did not make the motion phony, Disney would not

tolerate anything that destroyed believability. (Thomas and Johnston 1995)

A lot of the principles of animation are there to help make the animation more believable. Many were found after careful study of motion in the real world. One of the most influential new discovery the animators found was the principles of squash and stretch. This principle is about how the motion affect the object. "When an object is moved, the movement emphasizes any rigidity in the object. In real life, only the most rigid shapes (such as chairs, dishes and pans) remain so during motion. Anything composed of living flesh, no matter how bony, will show considerable movement in its shape during an action." (Lasseter 1987) Squashing and stretching help to convey the materiality of an object.

Since many of the principles of animation are based on observation, they are also based on physical laws, like follow through that is based on the law of inertia, which is about how objects keeps a constant motion unless a force act upon it. However even if the motion is based on reality, the animator should rather extract the essence of what they need, instead of copying it. (Garcia 2012)

There are several other principles that helps improve the believability of the animation. Some principles were based on observable causalities like the earlier mentioned anticipation, follow through and overlapping, and secondary action, others were based on how things tend to move like slow in and slow out.

The principles of solid drawing also helps enforcing the idea and make the animation believable. This principle is about observing how objects works in three dimension and making sure the drawings looks like it has volume, weight and depth. (Thomas and Johnston 1995)



Figure 1: The principles of solid drawing illustrated, the rightmost Mickey looks flat, while the leftmost have more volume and therefore looks more believable. (Thomas and Johnston 1995)

3.5 The principles makes it engaging

The animation might be clear and believable and have good causalities with meaning, but unless it is engaging so people will watch it, everything is for naught. The audience need to become invested in the animation and care about what they are watching.

The principles of appeal is not about making something cuddly, though this might have its appeal. Appeal is about making anything that the audience would like to watch, be it a quality of charm, pleasant design, or a striking pose. A drawing can lose appeal by being complicated or hard to read. (Thomas and Johnston 1995) The appeal can also be seen in the overall design of a scene.

Another way of engaging the audience is through using personality. If the audience cares about the characters they get invested and curious about their story. The animator can create personality through use of anticipation that helps the character looks like it thinks. If the character leads his or her motion by using the eyes to focus on their task beforehand the character will seem more intelligent. How a character moves also affect how the personality is perceived, so good use of timing, squash and stretch, and exaggeration can be useful to create a personality for a character. (Lasseter 2001)

4. APPLIED TO DESIGN

The animation principles can be seen as improving the animation by making sure it has clear, believable, and engaging causalities with meaning. The paper will now try to see if and how these aspects of a good animation can be an essential aspect for a designer as well.

In this paper design is understood as planning a product (Design, URL). A product can be anything that someone interacts with like a physical object, an interface or a service.

4.1 Design need a meaning

Design as well as an animation need a meaning or a purpose. In their book about the design methods "Vision in Design" Hekkert and van Dijk tells us to remember that design is the act of defining a vision of what to create. Designing starts with establishing the 'Raison d'être' (the reason for existence) for the final design. (Hekkert and van Dijk 2011) There needs to be some kind of meaning behind a design, the fundament that the rest of the design process can be built upon.

4.2 Design consist of causalities

Norman talks about causalities in his book "The design of everyday things". He explains that people look for causes of events, to form explanation and stories. From own experience and stories from others people tend to form generalizations about how people behave and things work. When cause-and-effect pairings make sense, people accept them and use them to understand future events. (Norman 2013)

Causality in design is also about how a user interacts with a product. Cause-and-effect is created at every touchpoint where the user is in contact with the designed product. This causality can be exemplified with sequencing in service design. This consists of three steps, a pre-service period, the actual service period and the subsequent post-service period (Stickdorn and

Schneider 2012). A product's causalities might be mapped by methods like user journey mapping (Martin and Hanington 2012)

4.3 Clear

It is important to make design clear. Dieter Rams, an influential designer that worked for Braun formulated 10 principles for great design one of them was: "Good design makes a product understandable. It clarifies the product's structure. Better still, it can make the product talk. At best, it is self-explanatory." (Makovsky 2004) When the product is unclear it will make it hard to use and bode for a bad user experience.

"Keep it simple, stupid", "Kill your darlings" and Ockham's razor are all expressions that are about keeping the focus on the meaning behind the design, and remove elements that can distract the user to create a simple design.

4.4 Believable

It is important that the user feels like they can trust a design and to do this it is important that the design is believable. One aspect of this is about how the product is perceived by the users, a spoon should not look like it will bend and melt as soon as it is put into the soup, and an exclusive brand loses credibility if it uses a kitsch commercial.

The animators looked at real motion to get a basis for their motion. Designers could do this as well, they can use techniques like observation and user testing (Martin and Hanington 2012) to base their design in the real world, and make it more credible.

4.5 Engaging

Just as animation needs to be engaging to have an appeal to the audience, so do the design to appeal its users. Norman explains this by showing how great designers produce pleasurable experiences. Experiences are critical to define

how people remember their interaction. (Norman 2013)

There are several other methods and principles of design that is about making the design engaging, one of them is the aesthetic-usability effect is about how aesthetic design are perceived as easier to use. (Lidwell, Holden, and Butler 2010)

5. COMMENTS

This paper concerns what a successful design or animation might consist of, but have not considered how to reach this point. The concrete techniques and methods that the principles of animation consist of are not applied directly on design in this paper. Instead, the results and concepts behind them have been tested to see if they might be relevant for designers as well as animators.

This paper shows that the traditional principles of animation creates animation that have meaningful causalities that are clear, believable and engaging. This is only one interpretation, and there might very well be other ways to understand how the principles creates successful animation. It might also be possible to create fairly good and useable design or animation that does not consist of meaningful causalities that are neither clear, believable nor engaging.

There has been one principle of animation that has not been considered in this paper, namely the principle of straight ahead action and pose-to-pose. The principle is about the approach of the animator uses to animate, and in that sense acts different from the rest of the principles that all impact the end result. There are aspects of Disney's technical innovation that were used in "Snow white and the Seven Dwarfs", like how the sound and music is synchronized with the animation, technicolor and advance camera techniques, that haven't even been considered in this paper. (Kaufman 2012)

6. CONCLUSIONS

The traditional principles of animation can be seen as making successful animation by making sure it has meaningful causalities that are clear, believable and engaging. The paper has tried to show how this is something designers should strive for in their work as well. The lesson derived from the animation principle can hopefully help designers to make better design, design that are clear, believable, and engaging causalities with meaning.

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