

4.2 Depiction of Motion; Animation

1 Introduction

How can perceptual mechanisms support effective depiction of motion? There are two different types of motion visualization: “panel to panel” (e.g. series of panels in comics, images in motion pictures, frames in animations) and within panel (e.g. single still image). [3] In this essay, I am going to focus on three perceptual mechanisms related to “panel to panel” type of motion: persistence of vision, visual attention and inattentional blindness.

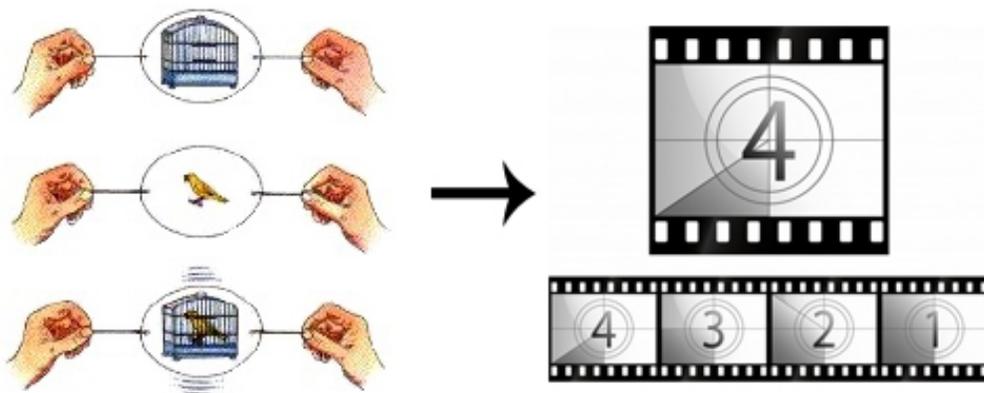
2 Perceptual Mechanisms

2.1 Persistence of vision: Fundamental Principle of Motion Depiction

How do we get an illusion of continuous animation when still images are projected in a series? The answer is one of the most important foundations of motion perception - “persistence of vision” principle. It states “that our eyes temporarily retain the image of anything they’ve just seen”. [12]

The way an ancient device, called the thaumatrope, (Fig.1) works explains that principle. [12] It has an image on each side of a card with two pieces of strings to hold it. At first glance, they are two separate images, but if the two images are rapidly alternated, two sides appear to combine into a single image. We know that its not a case, but it makes the motion seem seamless.

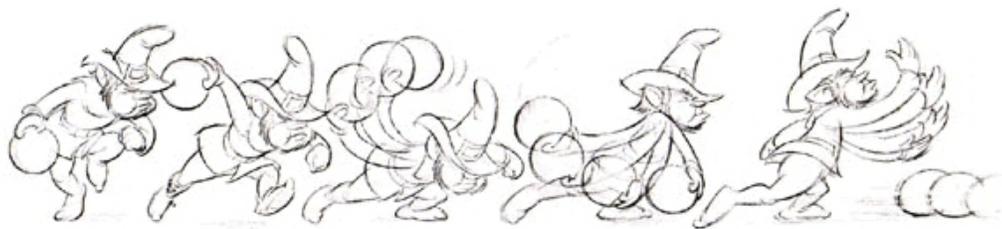
Fig. 1: Persistence of vision explained by a device, called thaumatrope. This principle played an important role in movies and animation development.



2.2 Visual Attention: Anticipation in Motion Depiction

How can we use our knowledge about visual attention in motion depiction? One of the examples is creating anticipation. If the viewers are not prepared to see something that is animated very quickly, it is possible that they may miss it. [11] Thus, animators should “prepare” the audience. They should focus viewers’ “locus of attention” [5] to a place, where an important motion is going to happen. One of the things that attracts our attention is motion onset. [4] Therefore, if a “preparatory” movement is made before the main movement, such as drawing back a hand before a throw, the attention of the audience can be attracted to the hand. (Fig.2) This ensures that they the audience sees the throw when it comes. [11] For the best effect, the anticipation is usually animated slower, than the main action. [12]

Fig. 2: Creating anticipation.



2.3 Inattentional blindness: Caveats in Motion Depiction

The human cognition research reveals surprising limitations of visual perception systems. One of them is called “inattentional blindness” and it is when the viewers fail to perceive a part of animation, even when it is presented in the viewers’ field of view and “occupy the same location in space as attended and consciously perceived” part. [10] The famous experiment that supports that phenomenon was conducted by Simons and Chabris in 1999. The observers were “blind” to the sudden appearance a person in a gorilla suit, even if it was walking right through the middle of the scene. [7] [1]

Closely related is “change blindness” which is described as “the inability to notice changes that occur in clear view of the observer, even when these changes are large and the observer knows they will occur.” [9] [8] [6] Naive observers may even fail to notice changes of main characters across cuts in a motion picture. [2]

Thus, by focusing attention of the audience to a particular part of the animation, there is a probability that the other parts will not be properly perceived. That may help explain some of the difficulties animators have faced in their attempts to depict motion and why the audience do not notice it.

3 Conclusion

Knowledge of human visual perceptual mechanisms can provide an effective implementation in motion depiction. In this essay, I have presented how understanding of persistence of vision, visual attention and inattention blindness can create an illusion of motion, prepare viewers for main action and make sure that they do not miss important actions in “panel to panel” type of motion depiction.

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