How Animation Works

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Background, Purpose, Hypothesis: The reason I chose to do a project about animation is that I have always loved to draw and create my own cartoon characters. Someday I hope to be an animator. This project is about animation and how it works. In other words, how can I make still images appear to be moving? I hypothesize that I can achieve animation by moving slightly different images very fast in a circular movement. Alternating black spaces with the images will allow the brain to rest between the images.

Procedure: I conducted four experiments from Jan. 16 to 28, 2003 to determine how to create animation effectively.

Experiment #1-Persistence of Vision Tube (Jan. 16, 2003)

Purpose: To understand how persistence of vision allows your brain to interpret many different images as one moving picture.

Prediction: I predict that I will see a whole image instead of just a slit.

Procedure:

1. Created a tube approx. 30 cm. Long, with one end closed, and cut .2 cm by 2.6 cm slit in the closed end.
2. Held tube end with one hand, shook end while looking through open end

Observations: As I looked through the tube I saw only a small slit with a fragment of a picture showing. When I shook it I saw a flickering picture that was larger then the original slit picture.

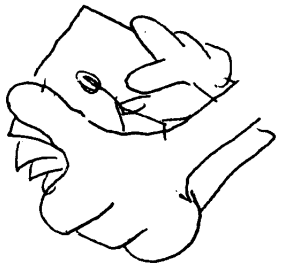
Explanation: Your eyes only see a small slit at first. Upon shaking the tube your eye sees many small pictures, and puts the small pictures together to make one big picture. This is known as Persistence of Vision, which occurs when you see a movie or cartoon.

Experiment #2- Simple Flipbook (Jan. 18, 2003)

Purpose: To find out what are the necessary components of a flipbook.

Procedure:

1. Cut ten pieces of paper into equal parts (9.2 cm by 14 cm)
2. I drew slightly changing pictures of a stick man on paper
3. Stapled them together
4. Flipped it



Observations: The first time I flipped the book it skipped a lot of the papers. The second time I flipped however (this time each page was on a slant), it went as smooth as ten pages could go. I believe this is so because without the slight slant in each picture my thumb could not grip each page. However, with the slant each page was under my thumb so I could grip it

better. Although this successfully created animation, it was very choppy, short, and not very effective.

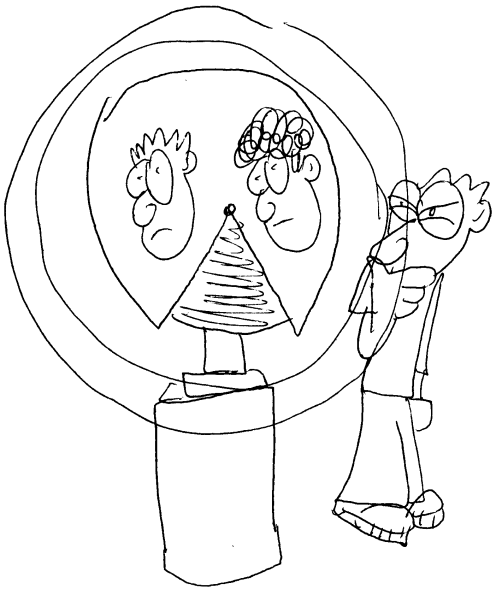
Experiment #3- Wheel of Animation (Jan. 23, 2003)

Purpose: To see if I could produce animation on a wheel instead of a flipbook. What is required to make animation?

Prediction: I predict that the image on the wheel will appear to be moving.

Procedure:

1. Cut circles out of wood and bristle board (109 cm circumference)
2. Divided bristle board circle into sixteen sections and coloured in every other space black
3. Drew gradually changing images in every other space
4. Spun it to see whether the spinning pictures created animation
5. Put a black covering over wheel, only open enough to show one space
6. Spun it again
7. Went over images in black permanent marker to make them appear bolder
8. Spun it again



Observations: Even though I made modifications to the wheel, the image was still blurry. The first time it was blurry because there was so much movement going on at one time that my brain could not focus on one thing. The second time when it was blurry I believe it was so because the images were too faint. However, even once the pictures were made bold, the overall image was still blurry. The reason for this is that not only is the image moving but the pictures are going by. Too much is moving for the image to be focused on. The effect is very much like looking out the side of a moving car. The scenery passing by is too blurry to focus on anything. The brain cannot interpret images constantly flashing at it.

Experiment #4- Complex Flipbook (Jan. 28, 2003)

Purpose: After experimenting with the wheel, and having learned that for successful animation each image cannot actually be moving when you see it, I wanted to make some animation that would work well.

Procedure:

1. I drew a gradually changing image of a cartoon onto 71 pieces of paper
2. I clipped them together and flipped the flipbook to make sure it worked
3. I scanned it into the computer
4. I saved them onto a slideshow and played it

Observations: The flipbook played much better on the computer. I believe this is because the computer does not skip any images. If you make the pictures gradual enough and put them onto a slideshow, it will go very smooth. The

pictures themselves do not move. Even though the images played at only 2 or three per second, it was still more effective than the flipbook and the wheel.

Conclusions, Applications, Results: When I first looked through the tube I saw only a thin line of the environment. However, when I shook the tube I could see all of my surroundings, thus demonstrating the existence of Persistence of Vision (when the brain puts a group of images together to make a whole picture or a moving picture). The flipbooks both demonstrated animation effectively. The wheel, on the other hand, did not work. My hypothesis was proved wrong. On the computer my attempt at animation worked. In order to animate images, you must project them in quick succession, rather than move each image. By doing various experiments I conclude that to have effective animation you must have many different images so that it is smooth. You also need each the images to stay in the same place. In my research I found that speed can effect how smooth the animation is, as long as you have many images. In movies, seventy-two images are played per second to ensure the smoothness of the animation. However, there are only twenty-four different images. They are played three times each. The twenty-four different images are to make sure you see all the action in that second, but the seventy-two images will make sure that the animation is smooth. Therefore, since there are seventy-two images per second, you need to play them fast. However, that doesn't mean that all animation needs to play at that speed. My animation is played at two to three images per second, and works fairly well.

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