Perception of motion

in static images

Motion is perceived based on how the images move across the retina in our eyes. If an object in our field of view moves, we perceive it to be in motion.

Motion can be perceived if the viewer is stationary or if the viewer is also in motion. For example, a person standing at a seashore observing the waves perceives motion based on the image of the waves moving across the retina. A boy chasing a dog also perceives motion due to the movement of the image of the dog on his retina, even though he himself is in motion and the background is stationary.

When we are looking at a photograph, there is no movement occurring in the images on our retina. But we can still be able to perceive the motion.

For example, when we look at this image, we can imagine the girl's hair moving.

In this image, the kids continue to laugh in our minds.

What makes us perceive motion in static images?

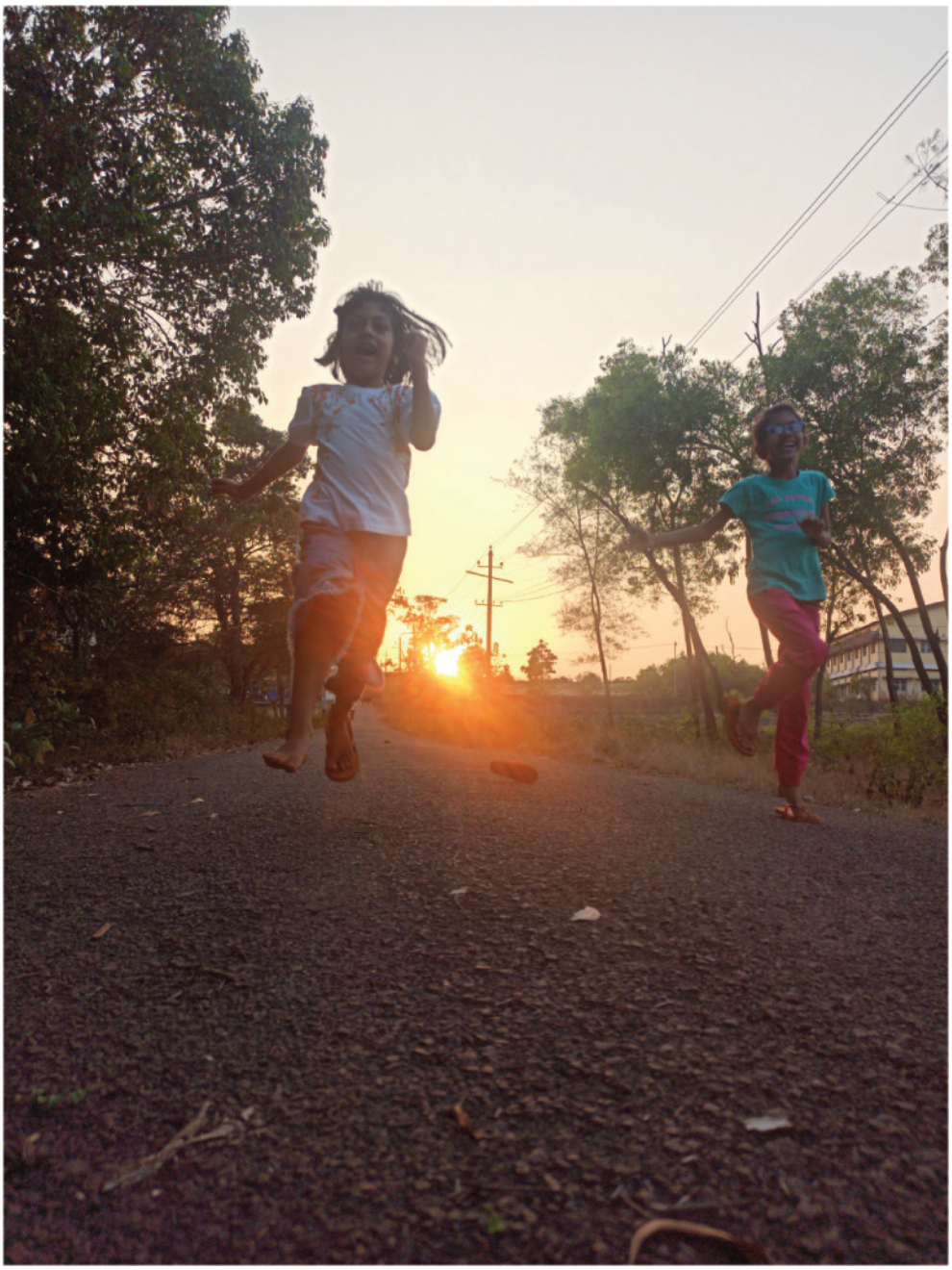
Actions

In an image, when there is an action involving motion, we tend to see the image as a ‘freeze-frame’ of the action. Even if it is a static image, the motion is implied due to certain cues. Hence, in our mind, we might ‘unfreeze’ the action and predict the motion that is going to occur next.

The girl’s right hand swaying away from her body, placement of her feet and the water splashing near her feet are the cues that help us perceive motion in this case, because of which we can imagine the girl walking towards the left of the image.

Similarly, here the two legs of the animal aren't touching the ground and are bent in a way that hints towards walking.

The girl's skirt and her hair moving from left to right are the cues which help us predict that she is twirling anti-clockwise.



The feet of the kids above the ground, the placement of their hands and their hair moving indicate the occurring action i.e., running in this static image.

The cues that help us perceive motion here are the feet of the girl not touching the ground, her hair moving and the flying tie-wrap of the umbrella. Due to this, we anticipate that the girl will be moving towards the left of the image.

Blur

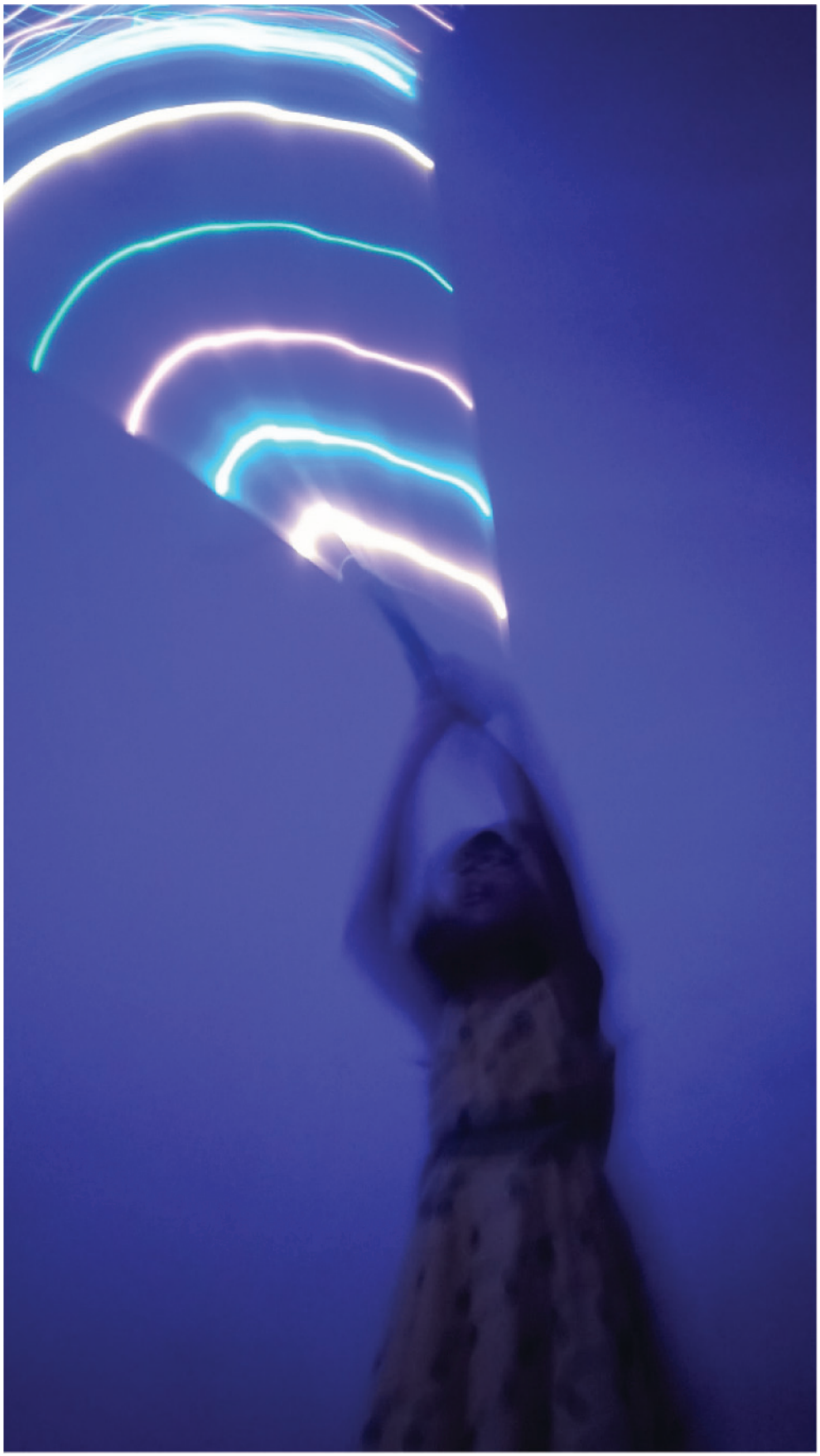
If an object in a static image is blurred, we perceive such object to be in motion.

The blurring of the girl's skirt is helping us perceive that it is in motion. We can anticipate that her skirt is moving. The increase in blurring at the edge of the skirt indicates that the motion is fastest towards the edge. Along with this, her foot not touching the ground is another cue that helps us perceive the motion.

Did you anticipate that the girl is about to sneeze?

Her facial expressions and the blurring of her hands and bracelet clearly indicate the motion that is involved in this action, i.e., sneezing.

In the above images, everything looks relatively stationary other than the flying burds which are blurred.



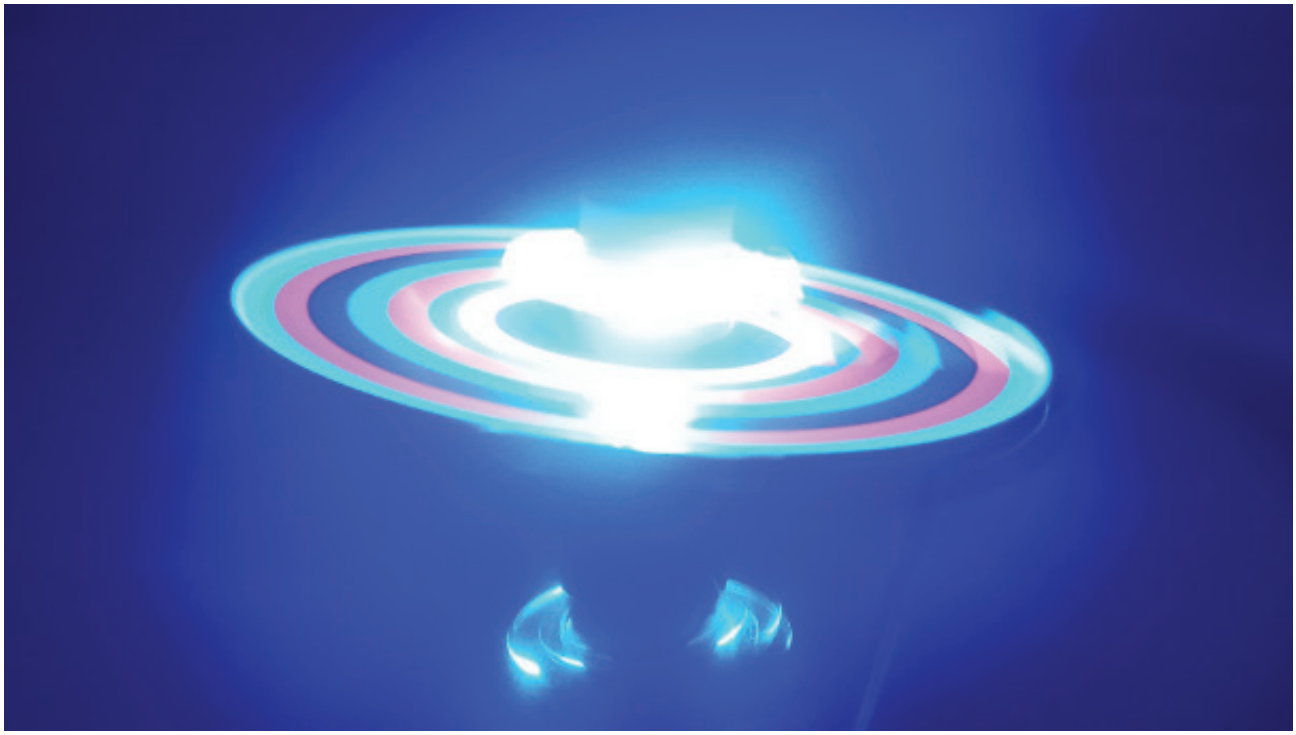
The cues that help us imagine that the girl is in the process of casting a spell with her wand are her blurred edges and the blur in the strings of light.

In the image above, a part of the image i.e., the parapet at the front is blurred. But, because of our prior knowledge that the parapet doesn't move, we can perceive that the camera itself is in motion.

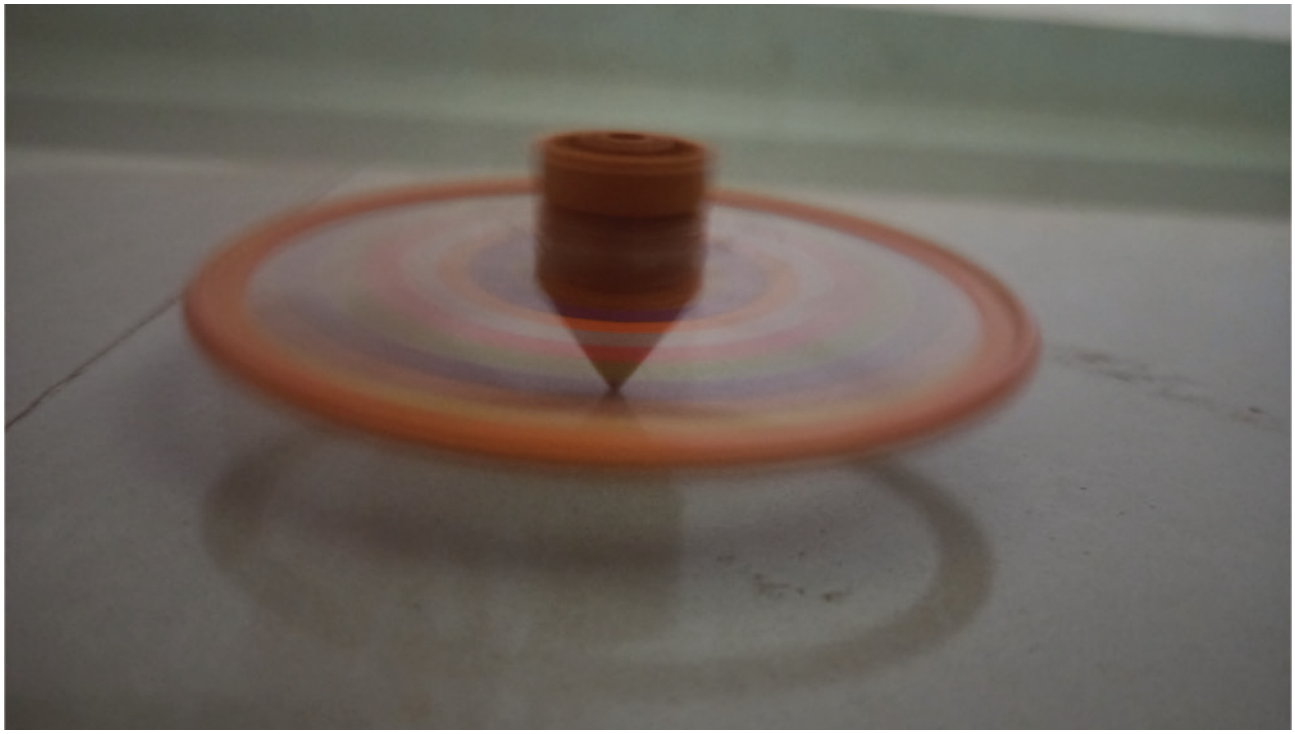
But here, the entire image is blurred which also indicates that the camera is in motion. In addition, there are other cues that suggest that the people in the image are also moving.

Prior knowledge

Our knowledge of a subject influences our perception of motion in a static image. For example, we know that the waves are in motion on a beach or, a waterfall is always in motion.



In this image, perception of motion is not very evident even though it is a ‘freeze-frame’ of an ongoing motion.



But, once we are able to identify that it is a spinning top, we can perceive motion because of our prior knowledge of this recognizable object.

We can perceive motion here because of our prior knowledge that the fire moves. In addition, the sparks and the smoke add to our perception of motion.

Our existing knowledge of firecrackers helps us perceive motion in this image along with the sparks and smoke coming out of it.

Because of our prior knowledge about rain and the shape of the raindrops, we can perceive the motion in this image. The bent foreleg of the cow indicates that it is also moving forward.

Our prior knowledge of water makes us perceive motion in ripples, splashes, waves, etc. In the image at the bottom, the water droplets are also blurred, adding to the perception of motion.

Direction of the object

The direction of an object helps us anticipate motion due to our prior knowledge of the object. If the objects are facing a direction in which they are usually not found, we perceive that they are in motion.

For example, the leaves of the tree are all pointing towards the left which makes us believe that they are in motion due to the wind blowing from the right.

The girl's veil is parallel to the ground and is following her which makes us think that the girl is moving towards the right of the image and due to inertia, the veil is in that position.

How can perception of motion in static images be used in design?

Advertisements and posters:

The perception of motion can be used to create different types of desired effects in static posters and advertisements even to imply specific events on book covers, storefronts, billboards, etc.

References:

Goldstein, E. B. (2013, June 25). *Sensation and perception* (9th ed.). Cengage learning

Perceived visual angle. (2021, September 13). In *Wikipedia*.