

Principles.of Motion.Graphics

ART430

Primary (Object) Motion

The movement of one or more elements over space and time. Requires awareness of an object's spatial properties.

- size
- spatial orientation
- positioning
- direction of travel



Motion is Relative

Similar to color perception, the way we perceive one motion is influenced by surrounding motions.

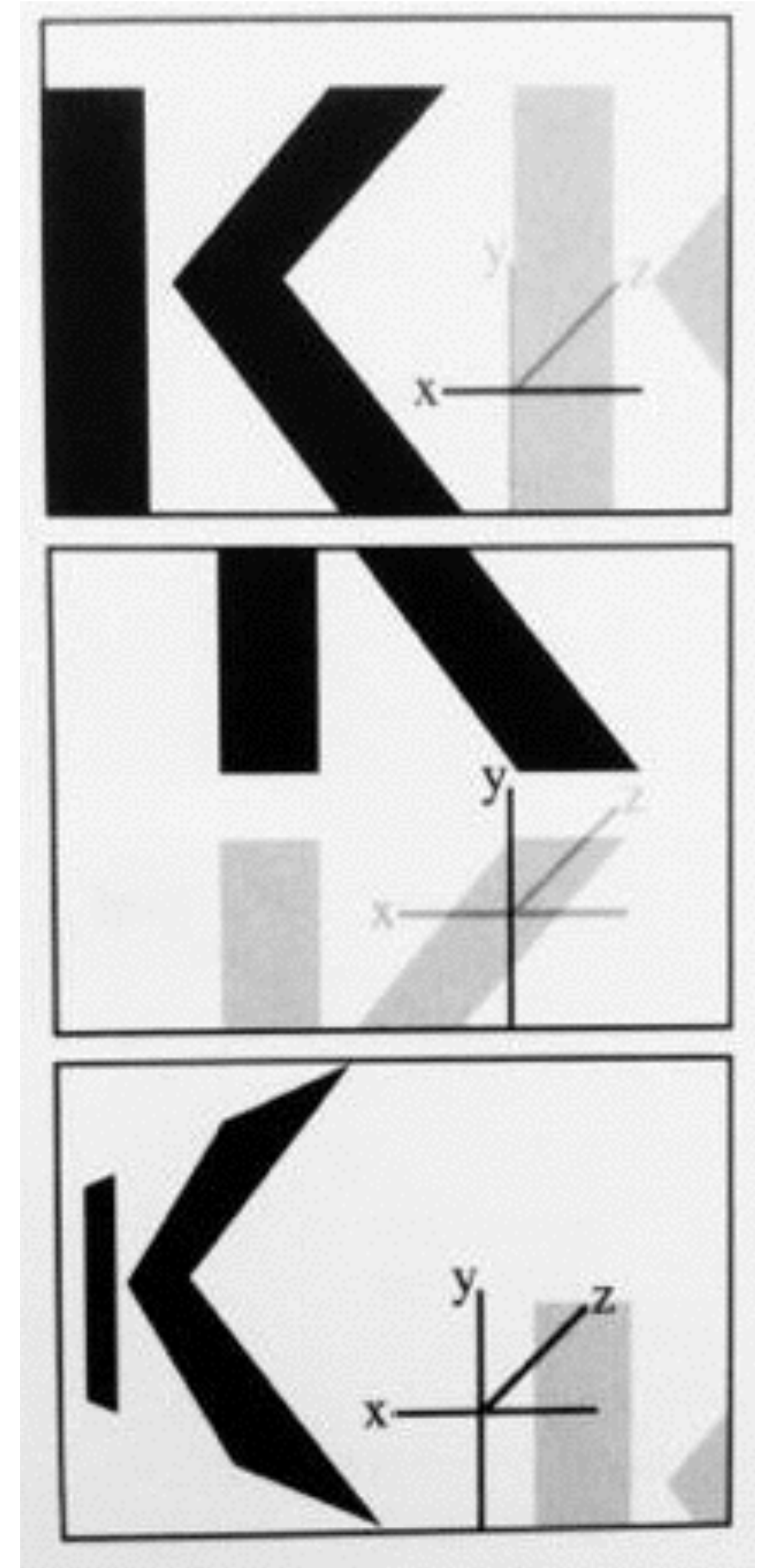
Requires coordination and choreography of various movements.

Translation

Animating an object's position along:

x & y (2D)

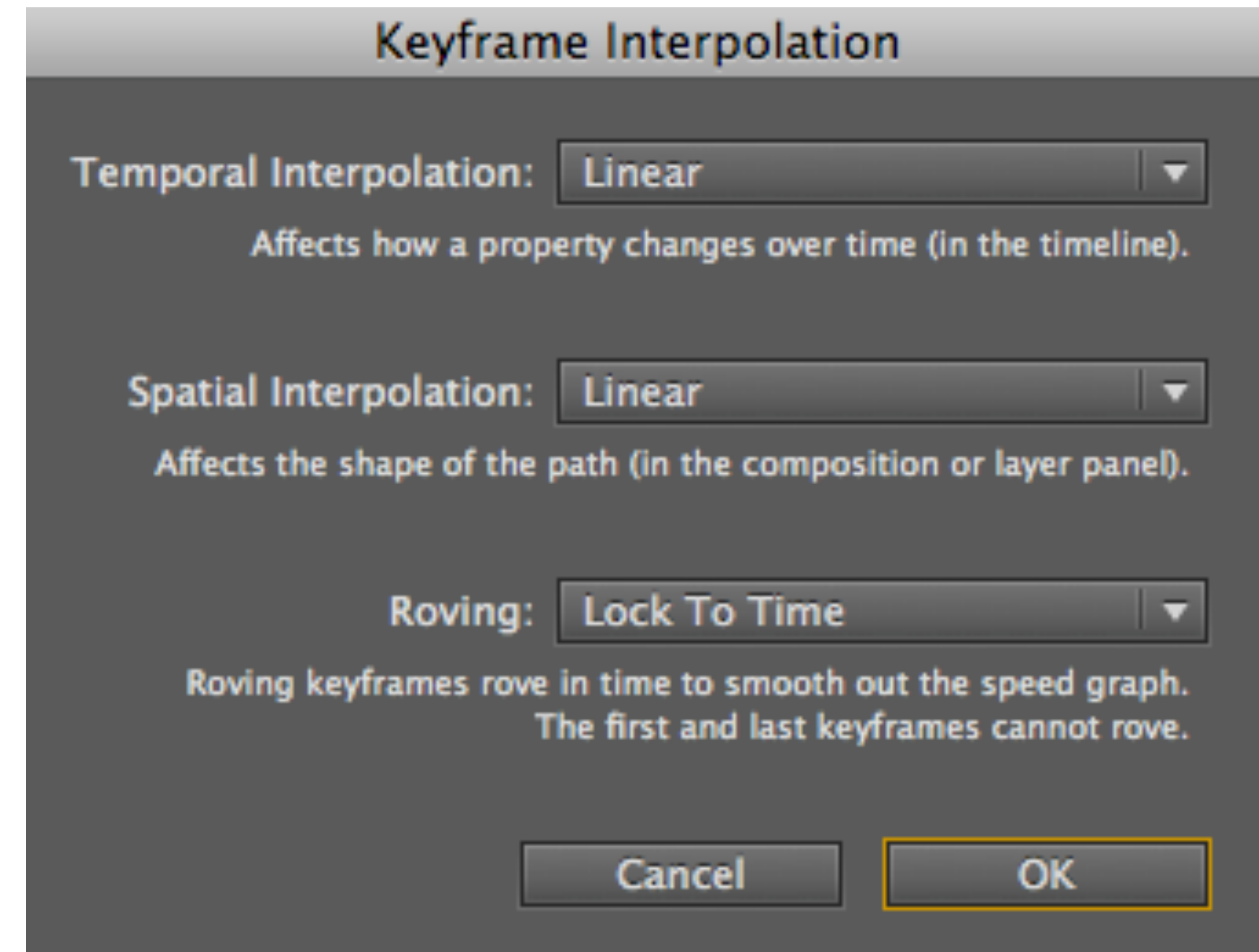
or x, y, & z axes (3D)



Direction

linear: straight line
(pendulums)

non-linear: curves (grass
blowing), erratic (kites)

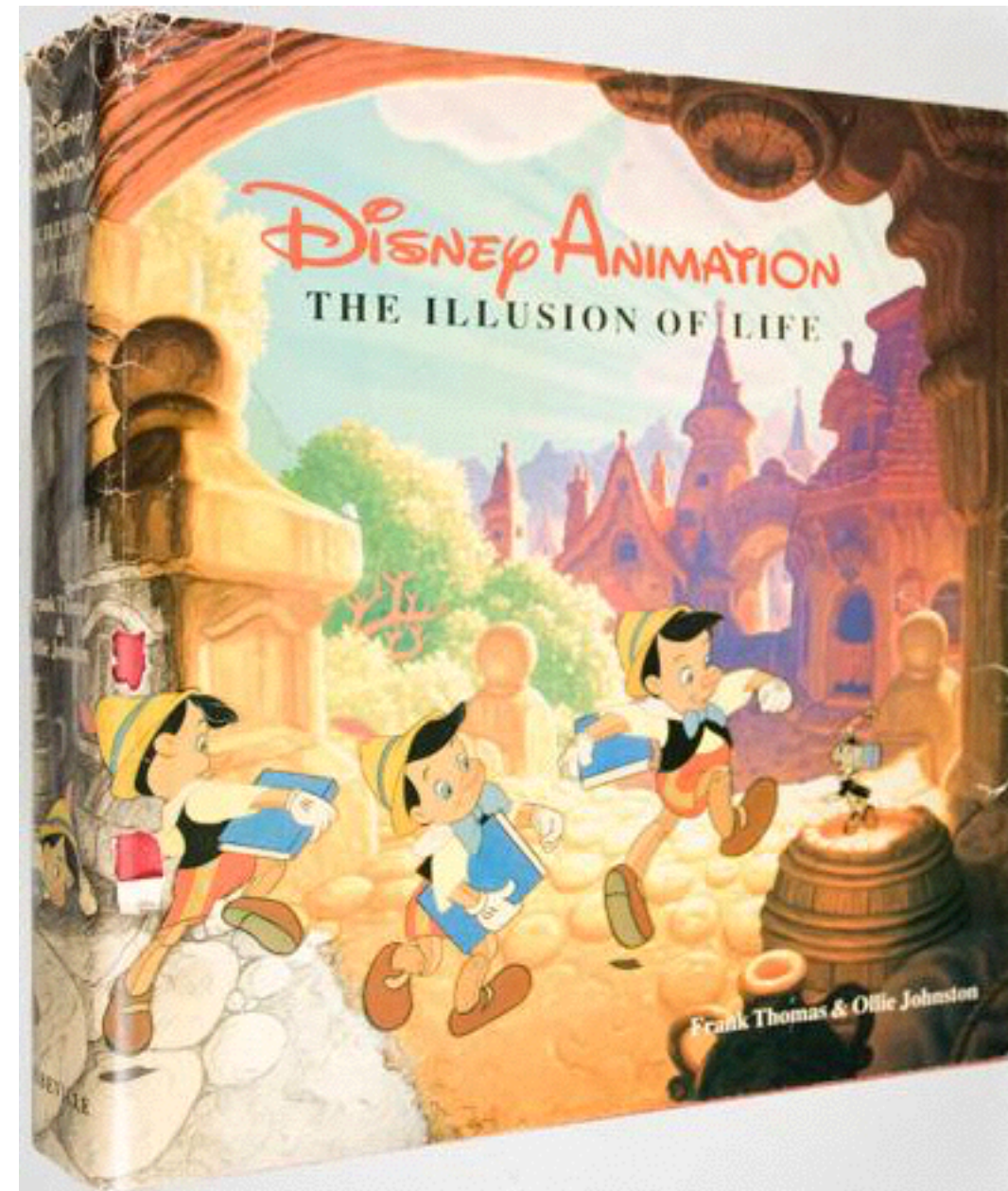


Principles of Animation

12 basic principles

Introduced in the
*Illusion of Life: Disney
Animation*

by Disney animators
Ollie Johnston and
Frank Thomas



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 ILLUSION OF LIFE



#1
SQUASH & STRETCH



#2
ANTICIPATION



#3
STAGING



#4
STRAIGHT AHEAD & POSE TO POSE



#5
FOLLOW THROUGH & OVERLAPPING



#6
SLOW IN & SLOW OUT



#7
ARCS



#8
SECONDARY ACTION



#9
TIMING



#10
EXAGGERATION



#11
SOLID DRAWINGS

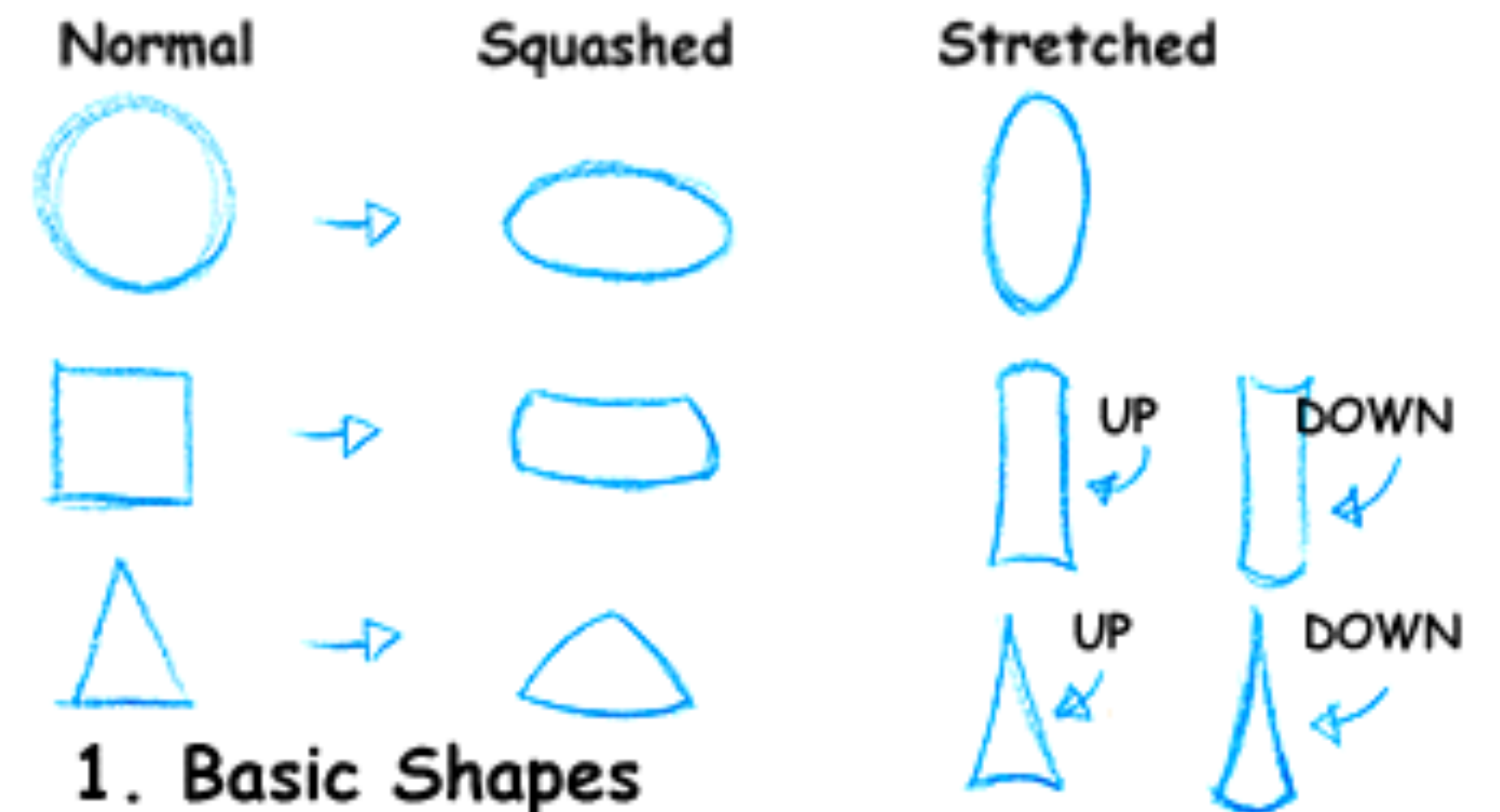
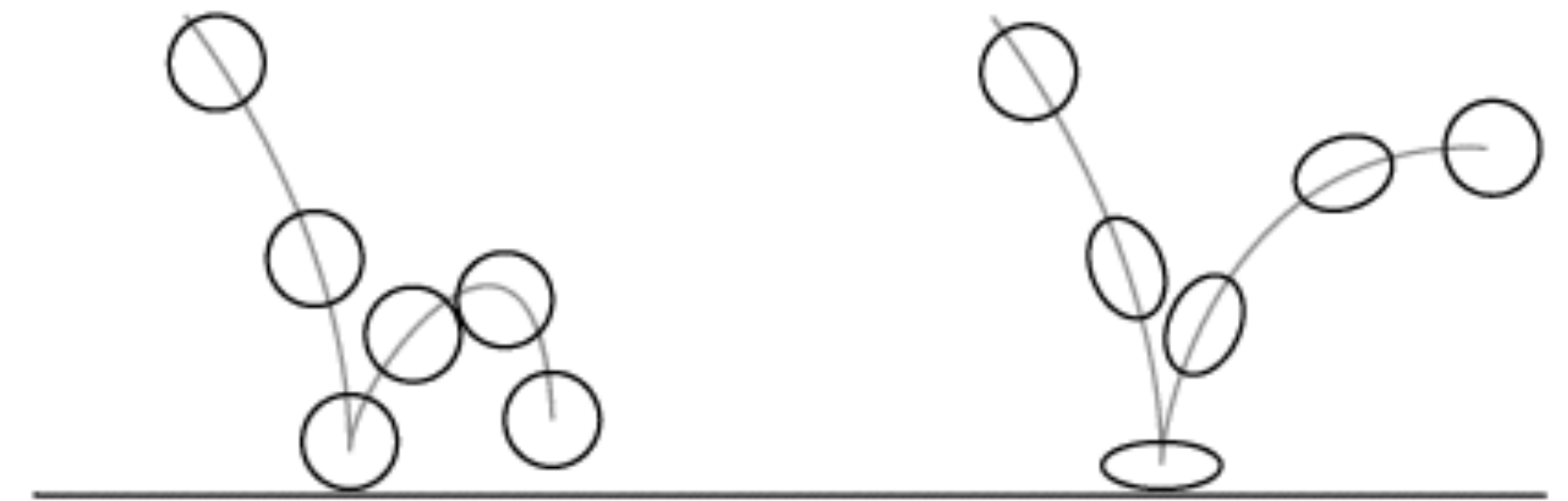


#12
APPEAL

Squash and Stretch

exaggeration to an object in motion

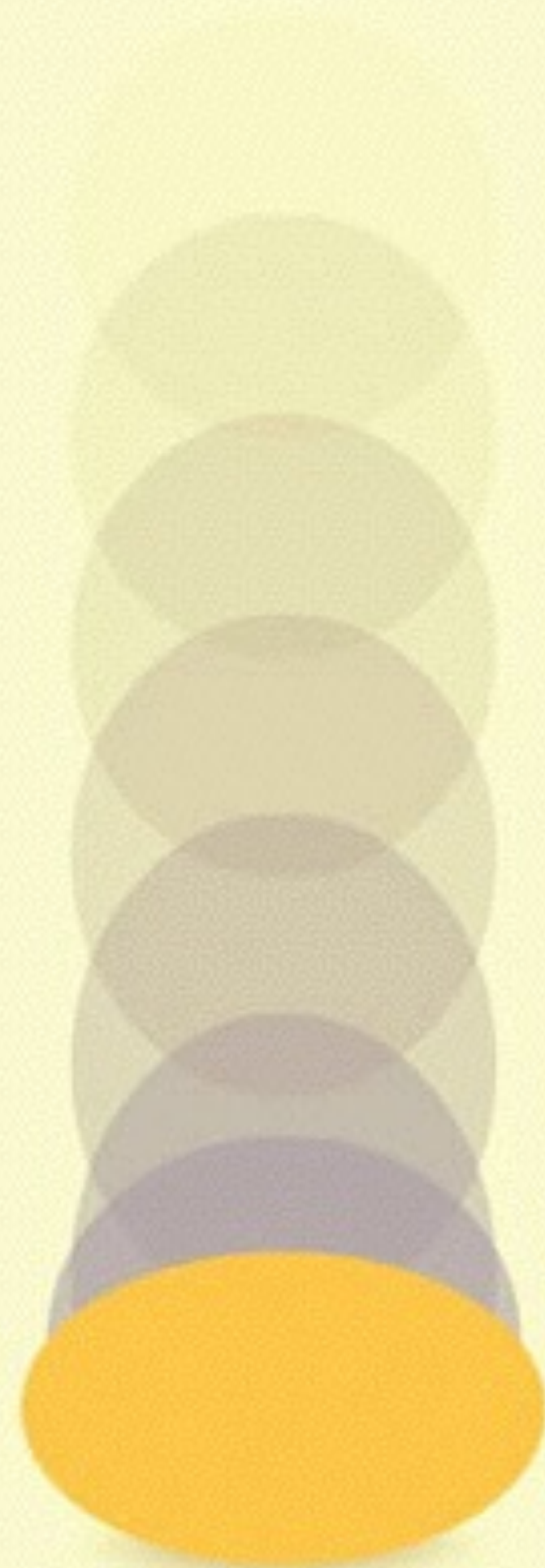
creates weight and volume



1. NORMAL SHAPE



2. SQUASHED SHAPE



3. STRETCHED SHAPE



4. NORMAL SHAPE



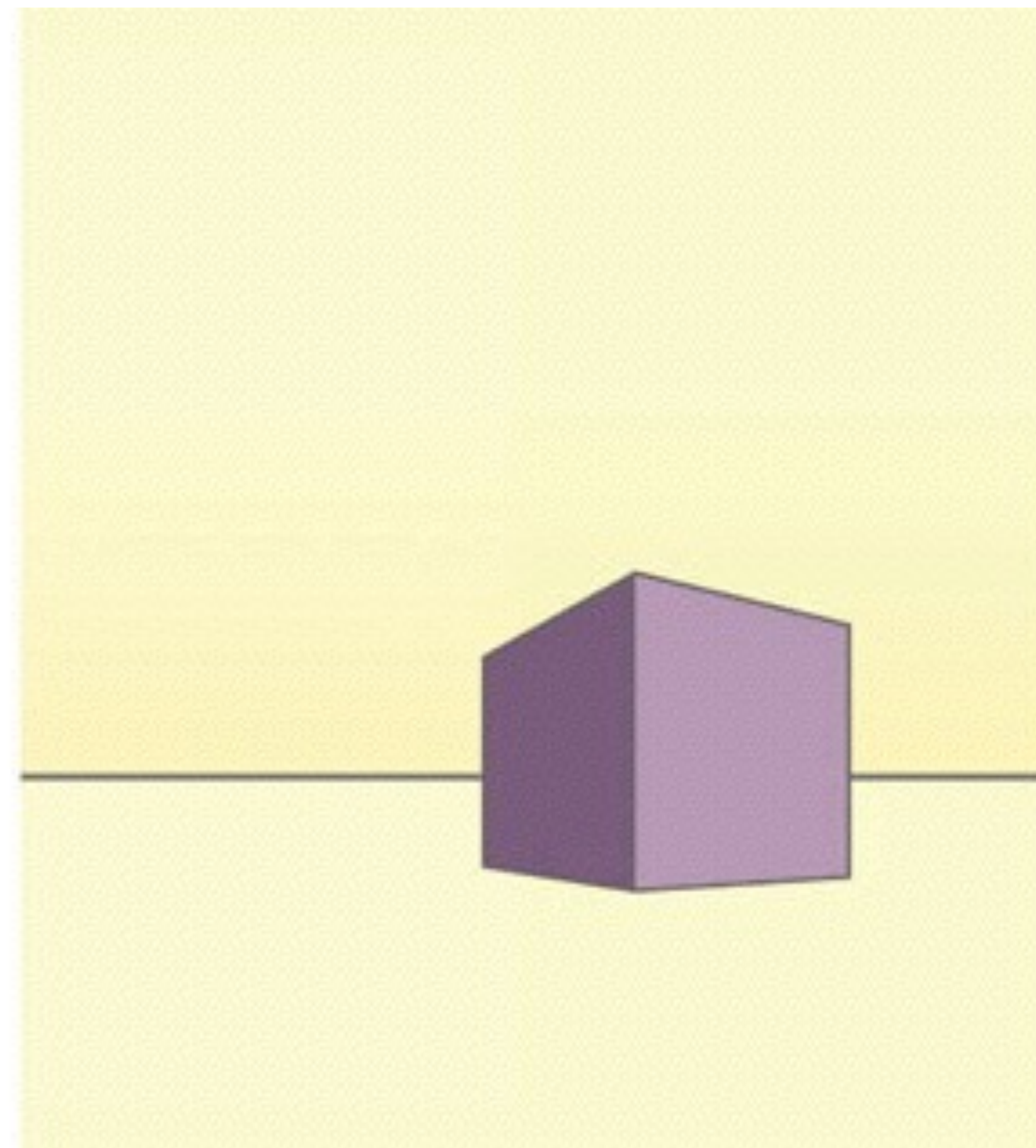
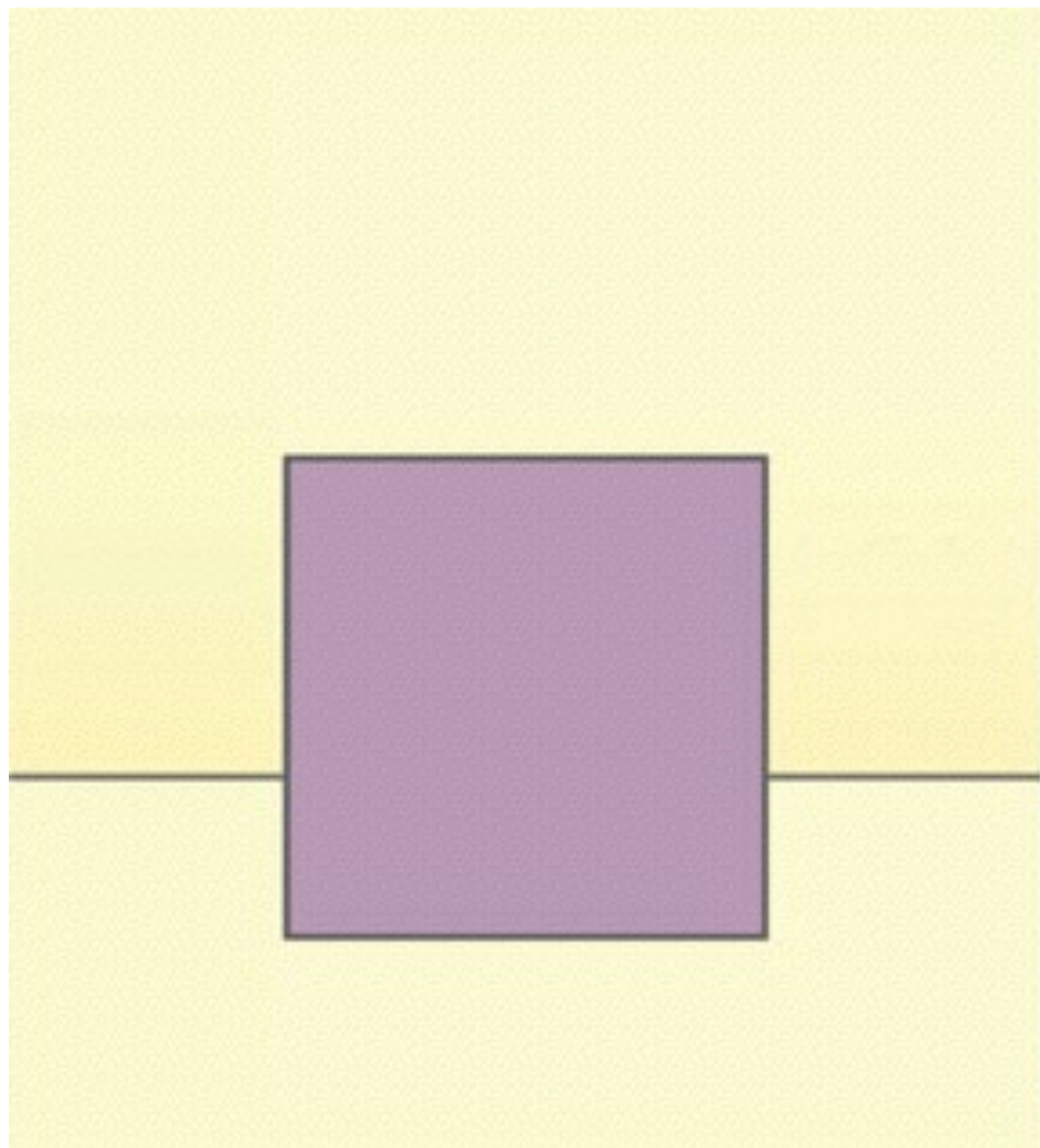
Staging

sets the stage for content

creates clear focal point

example: simplified background

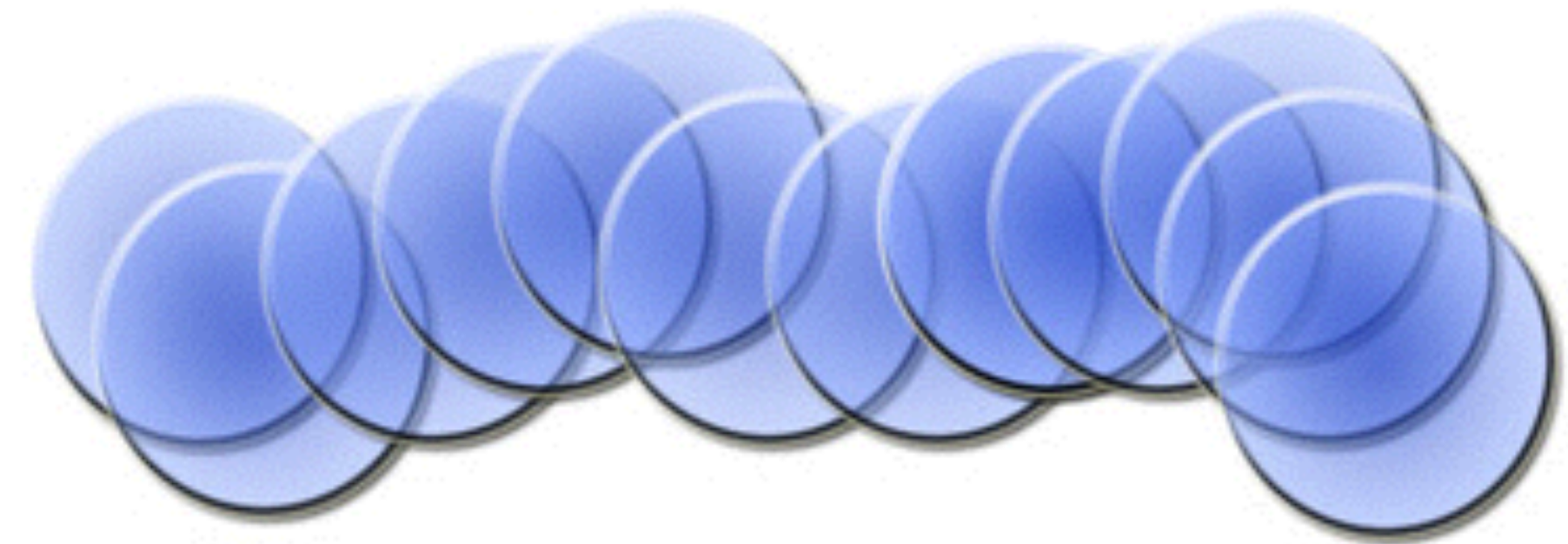




Straight Ahead Action & Pose to Pose

straight ahead: defines each pose in sequence

pose to pose: beginning -> end and fill in middle



STRAIGHT AHEAD

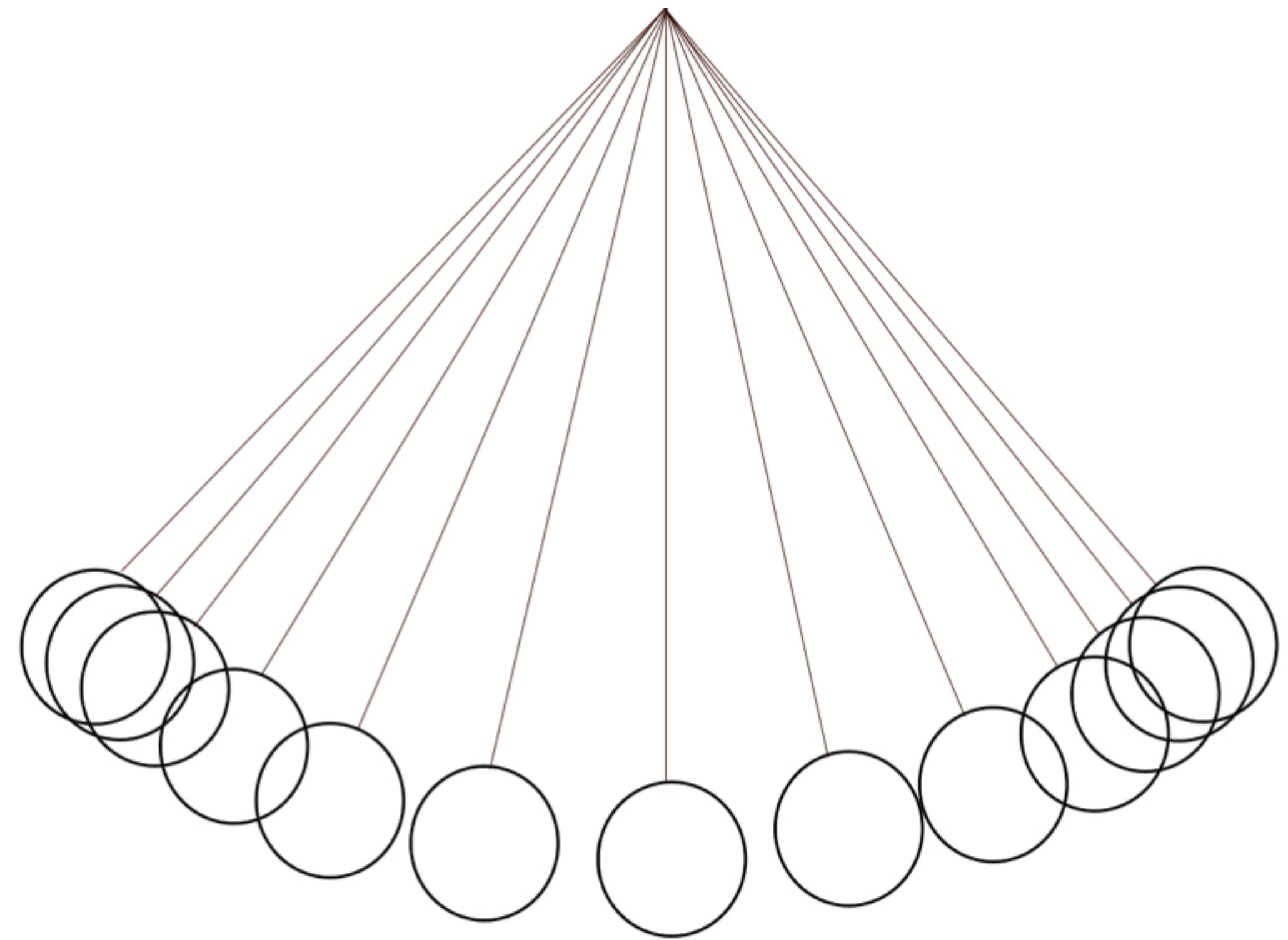


POSE TO POSE

Slow In and Slow Out

exaggeration to an object in motion

creates weight and volume



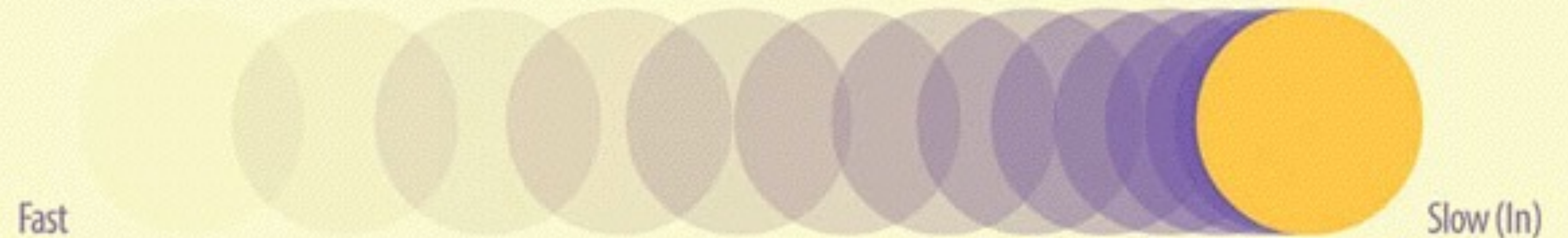
LINEAR MOTION

Object moves at a constant rate of speed from frame to frame



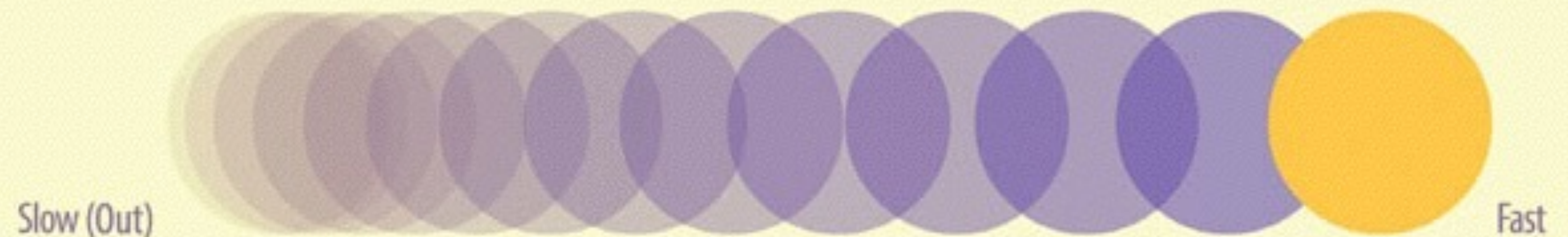
SLOW-IN

Object moves faster at the beginning of the animation and decelerates in speed at the end of the animation



SLOW-OUT

Object moves slower at the beginning of the animation and accelerates in speed at the end of the animation



Anticipation

Focuses on the movement right before the action.

Creates feeling of natural motion while hinting a motion will occur.

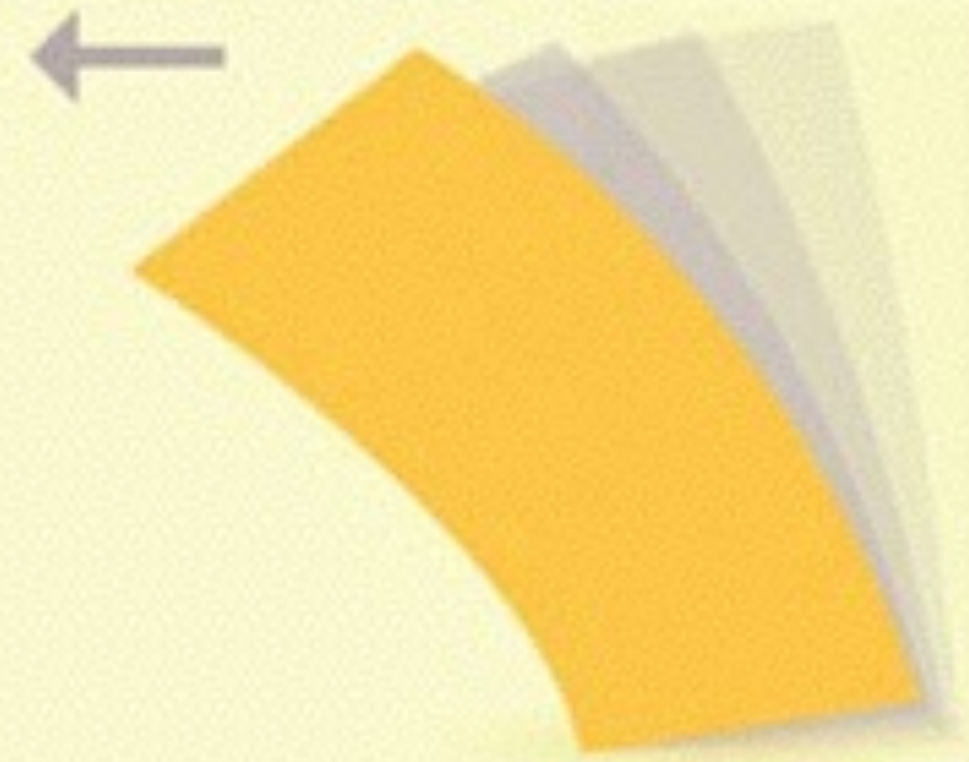
Examples: throwing a ball,
leaping off the floor

1. STATIC



2. ANTICIPATION

moves backward (opposite of main animation)



3. MAIN ANIMATION





Follow Through & Overlapping

Follow through: continuation of action past its termination point.

Overlapping: when an object changes direction while it motion and smaller parts lag in the new direction a few frames later.

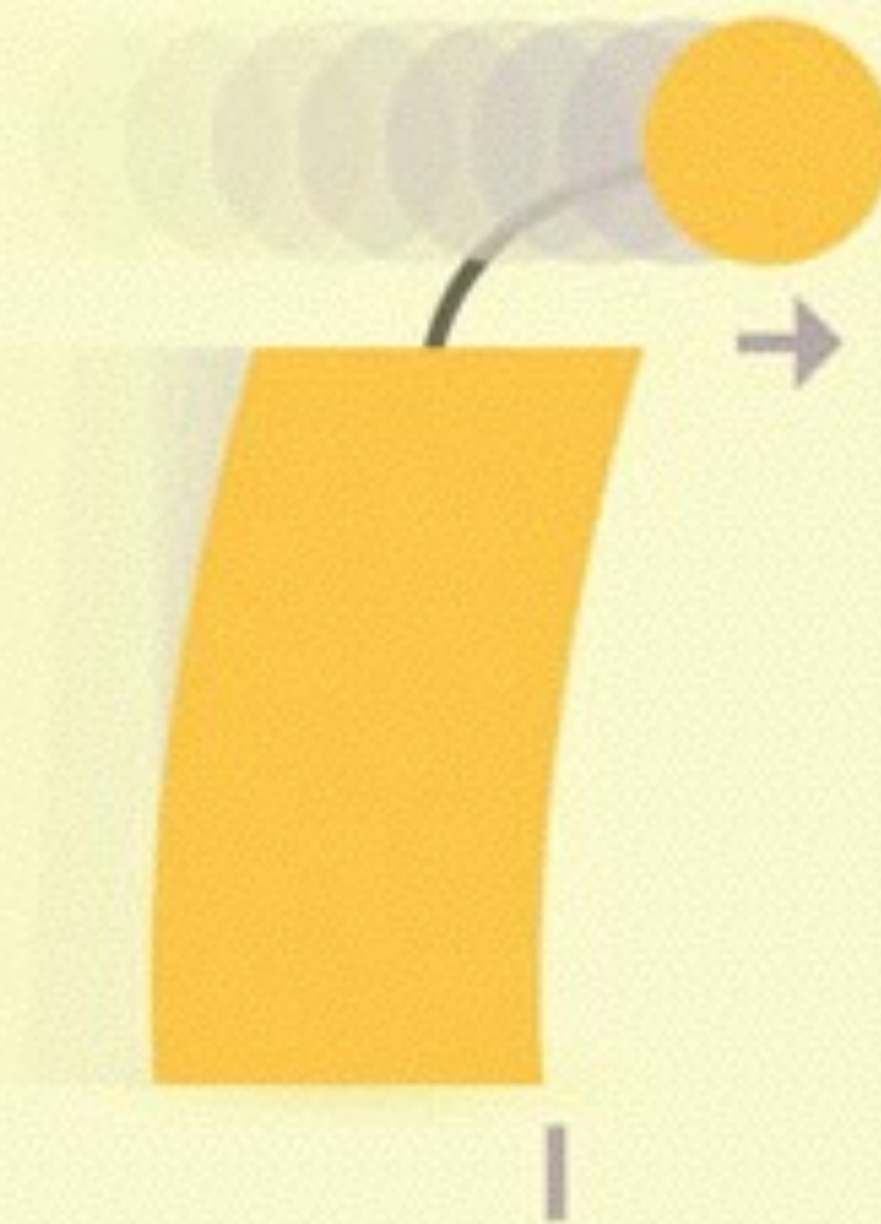
1. MAIN ANIMATION

individual parts lag behind as the main object moves forward



2. OVERLAPPING ACTION

the offset in time until all parts of an object catch up to the main motion



3. FOLLOW-THROUGH

individual parts of an object continue to move after the main object stops





Pause

Similar to the comma or semicolon in language.

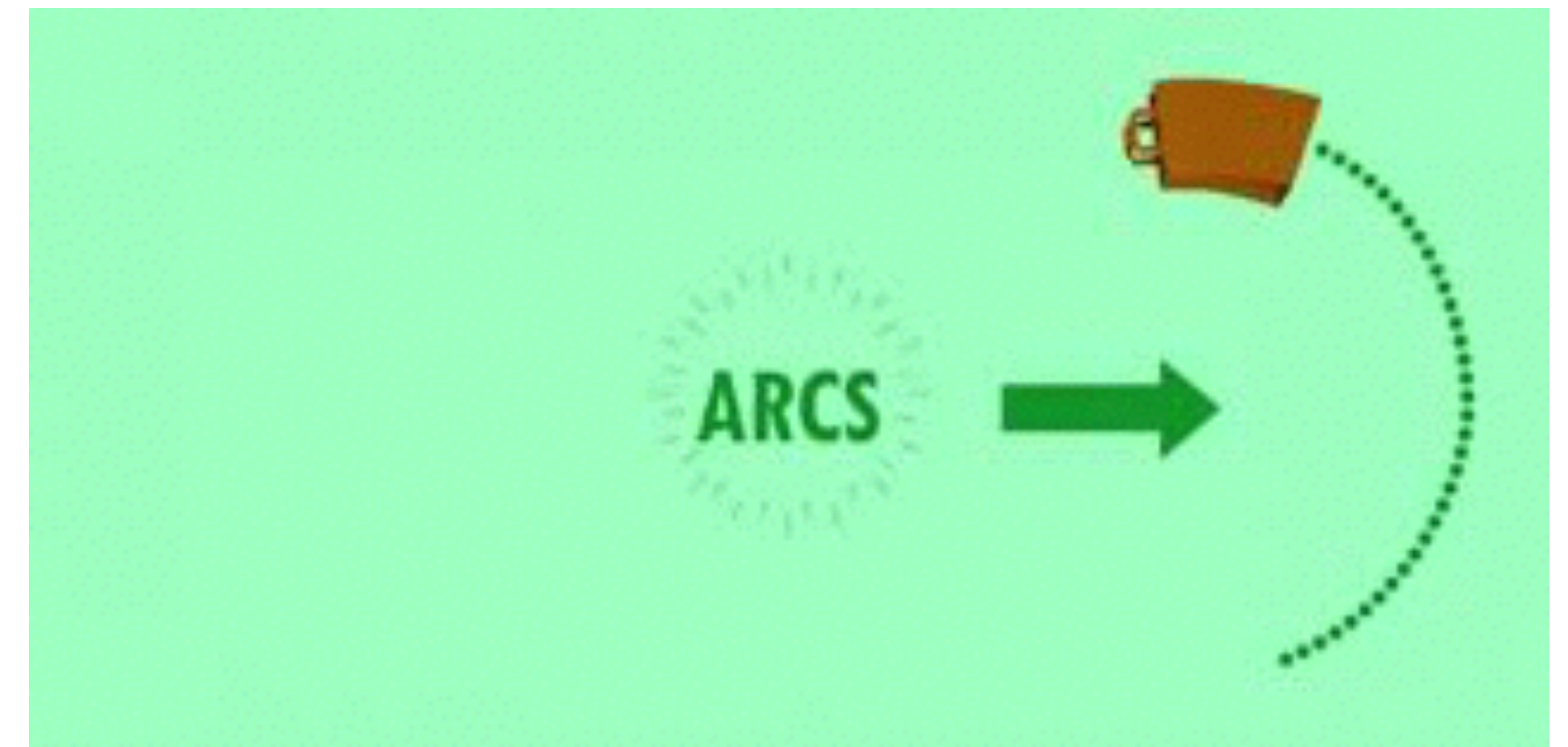
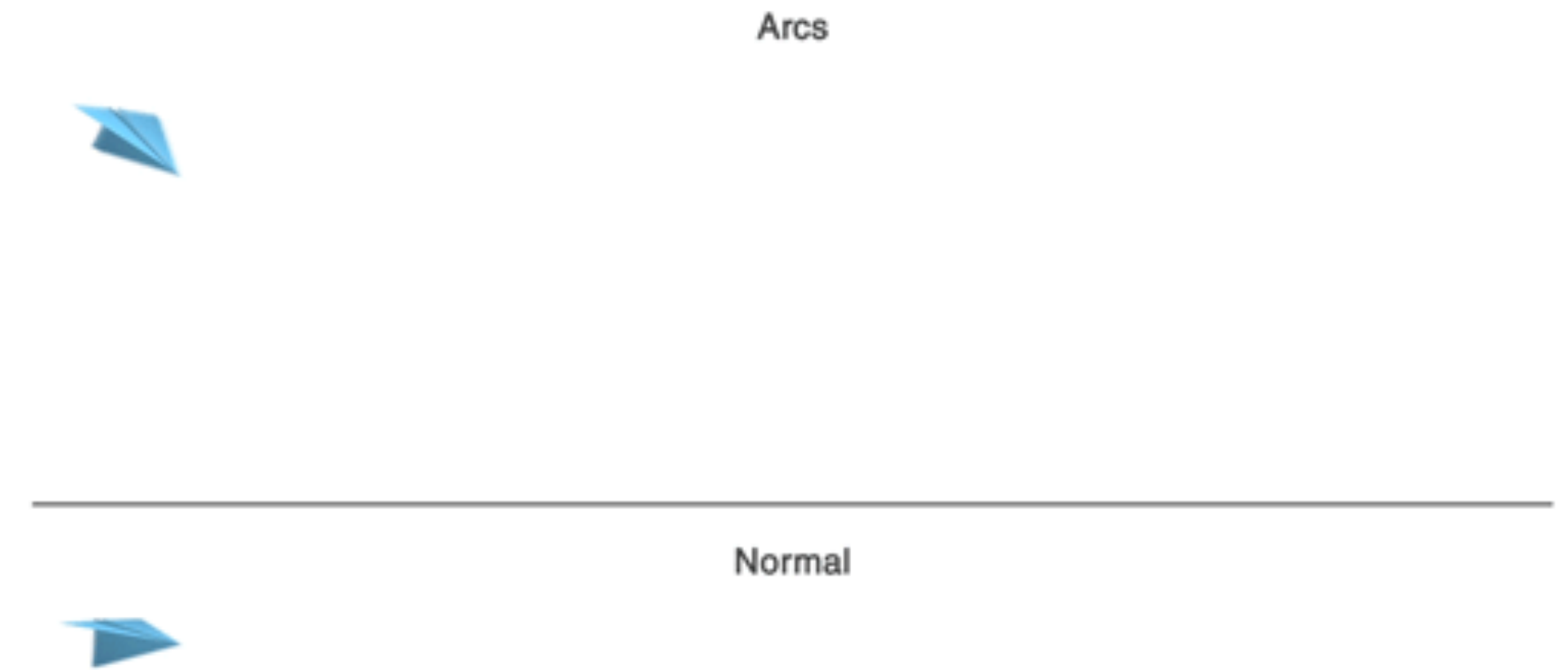
Prevents movements from becoming too frenetic or mechanical.

Example: Swings have a .5s pause at the top of each arc.

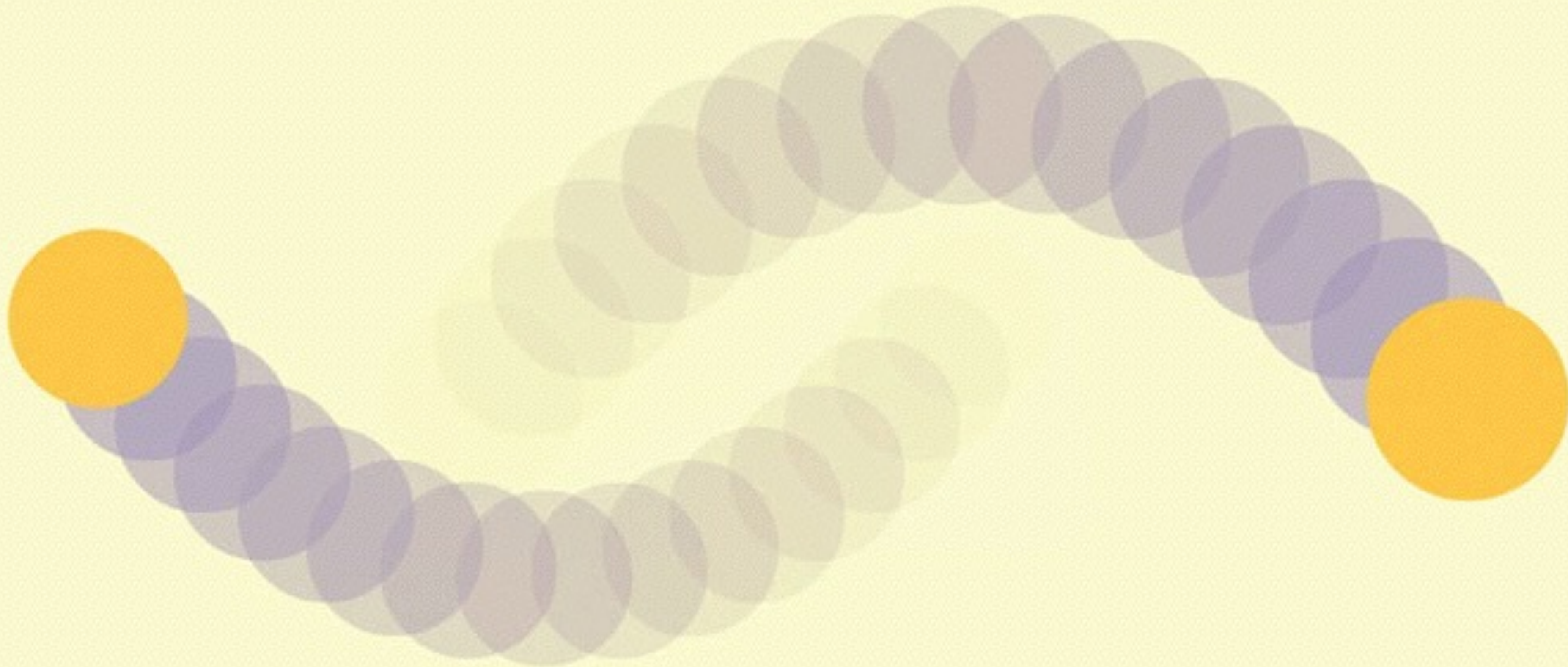
Arcs

Objects rarely move straight

Shows influence of gravity



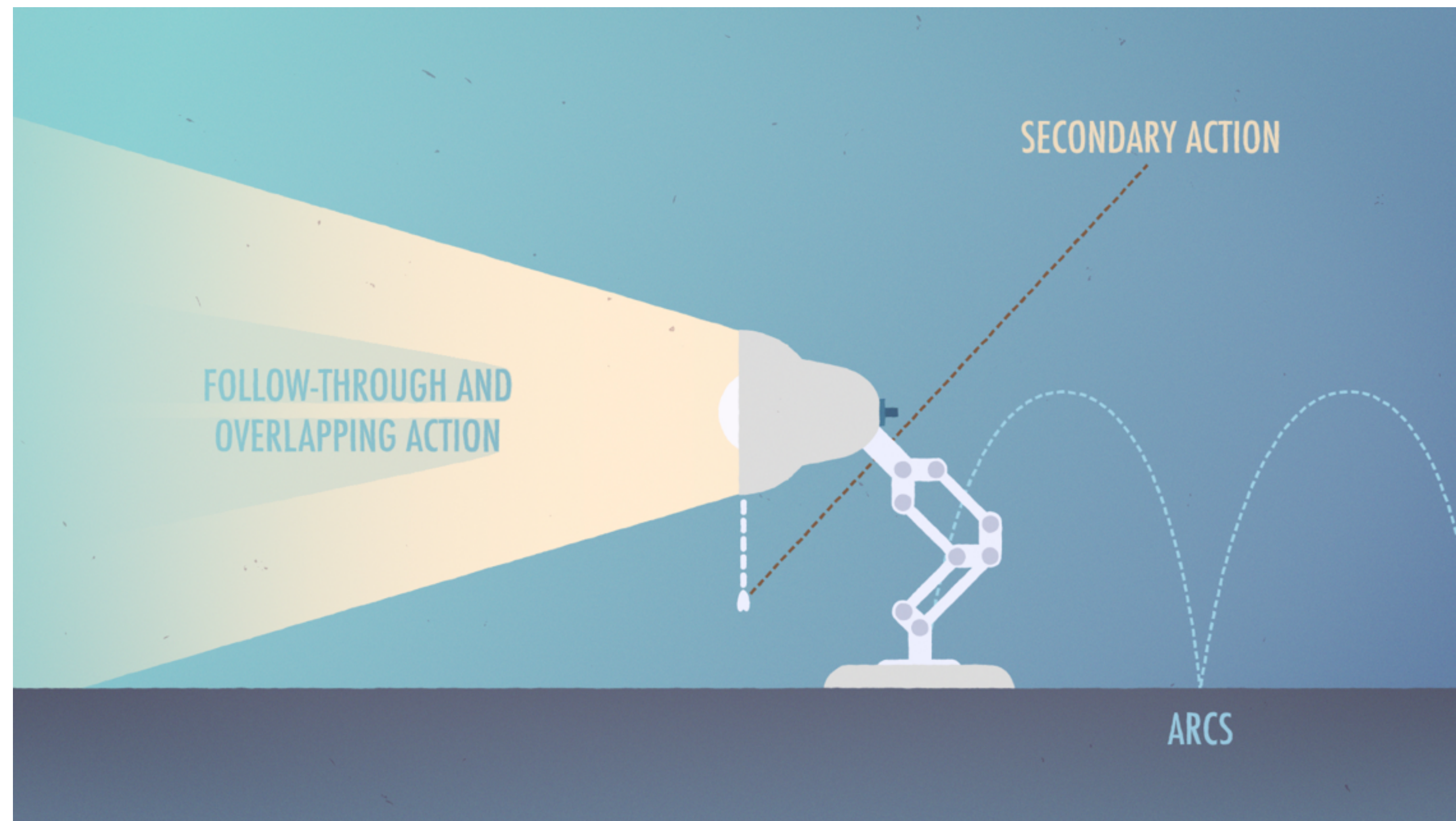
ARCS



Secondary Actions

Support primary movements

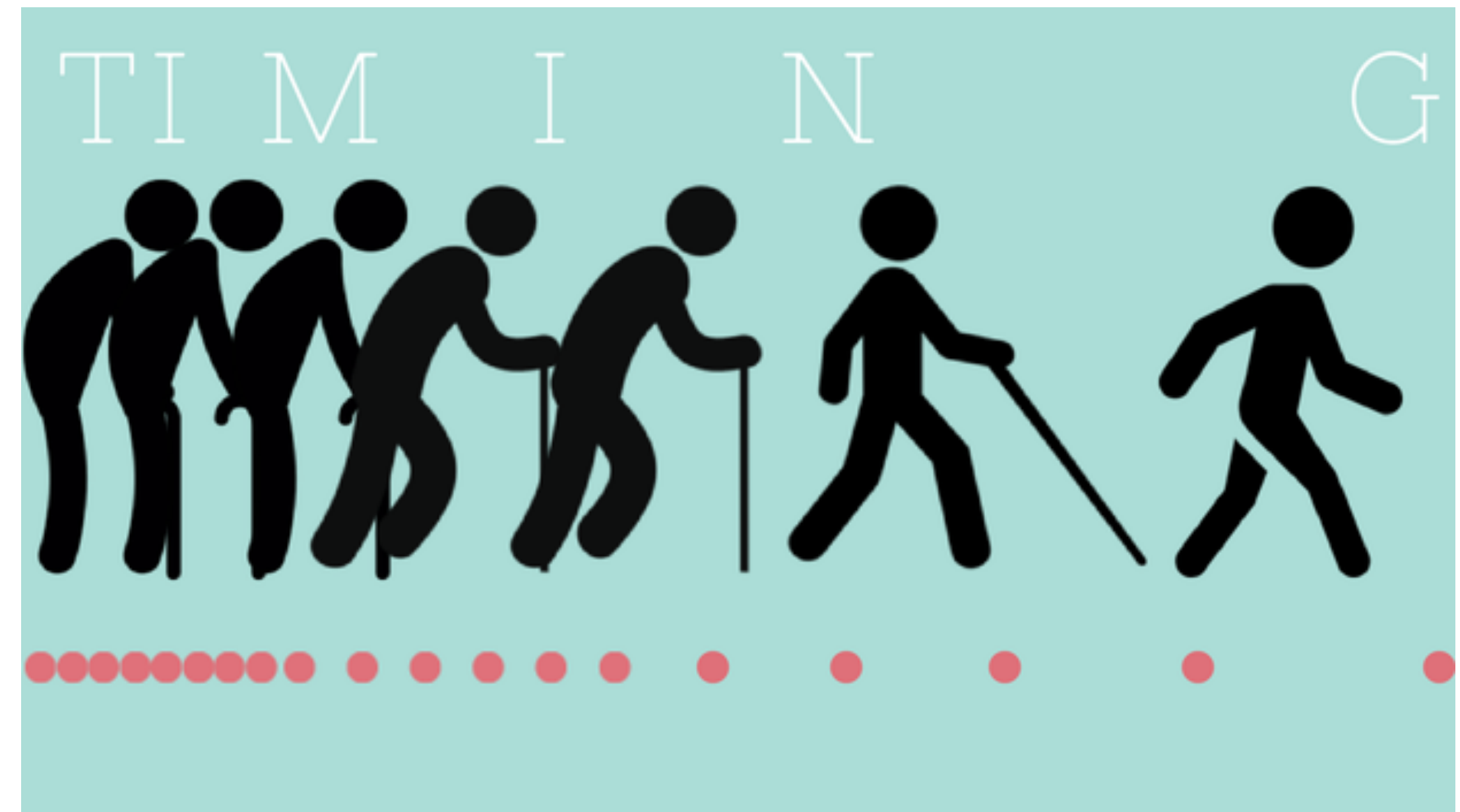
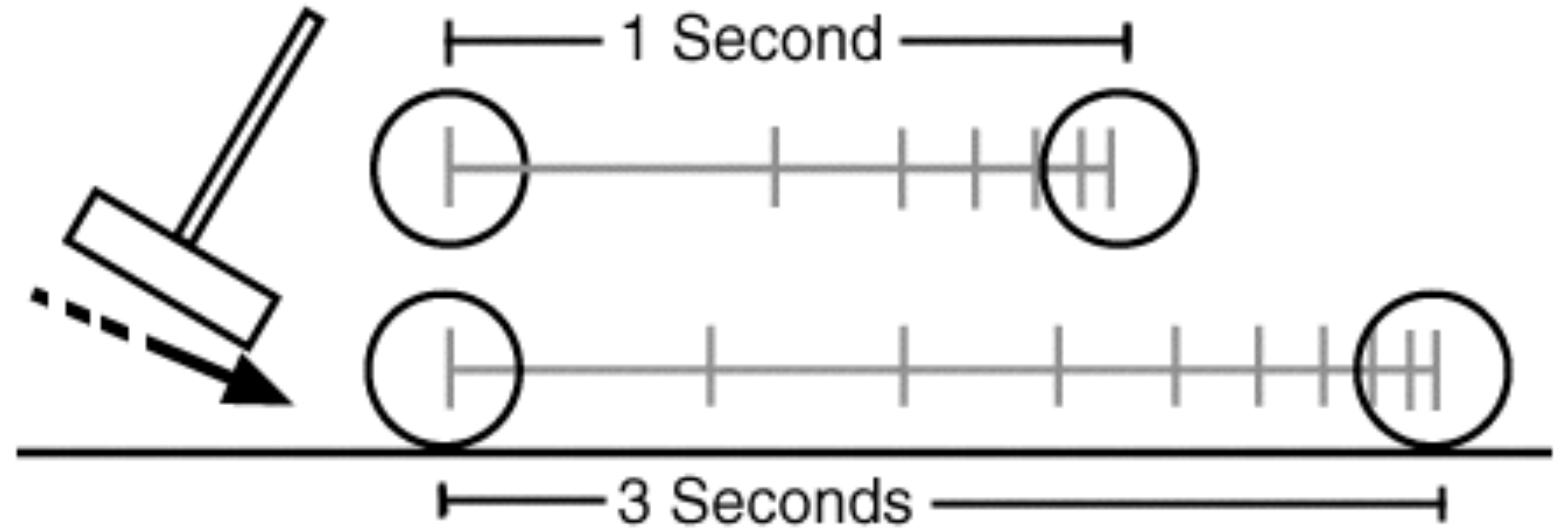
Examples: swinging arms, blinking



Timing

The way frames are drawn.

Creates personality and emotion.



Solid Drawing

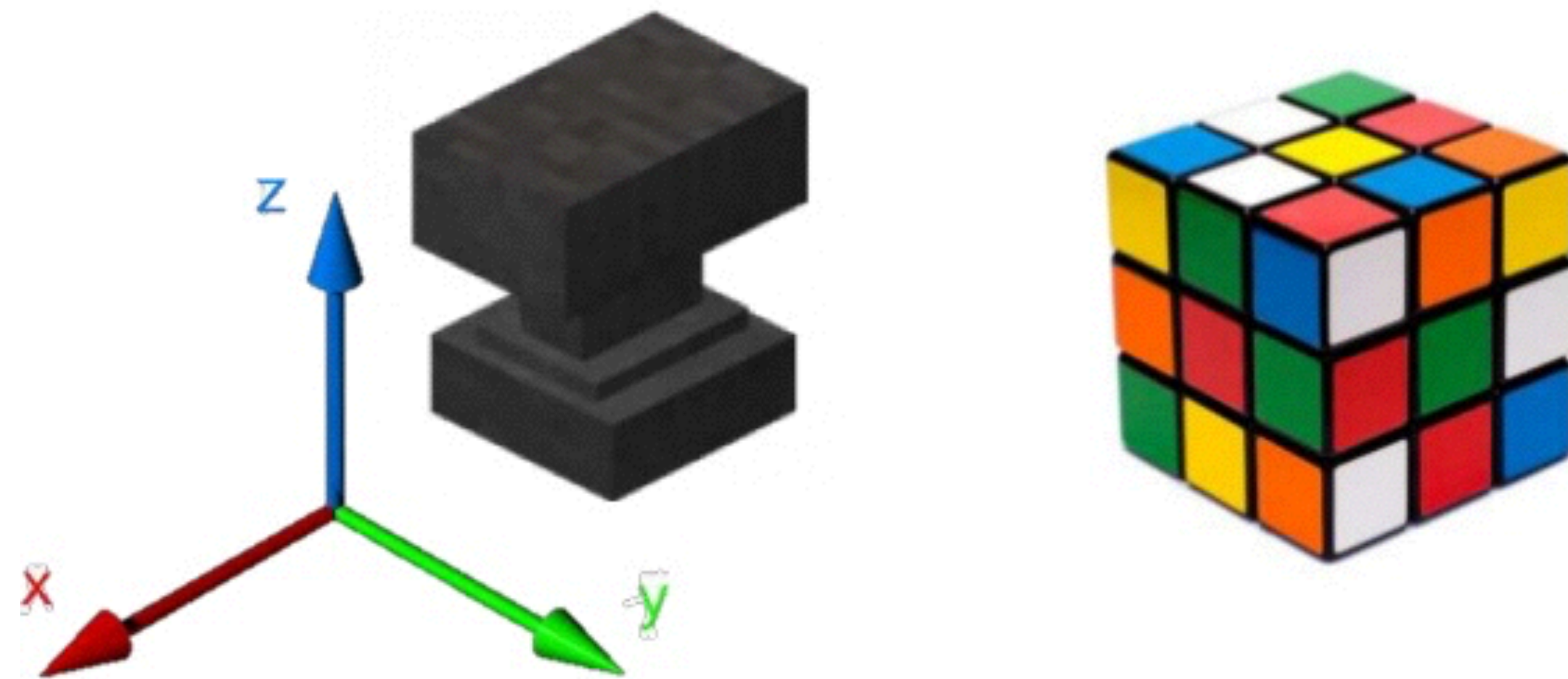
Creation of realism within a three-dimensional space.

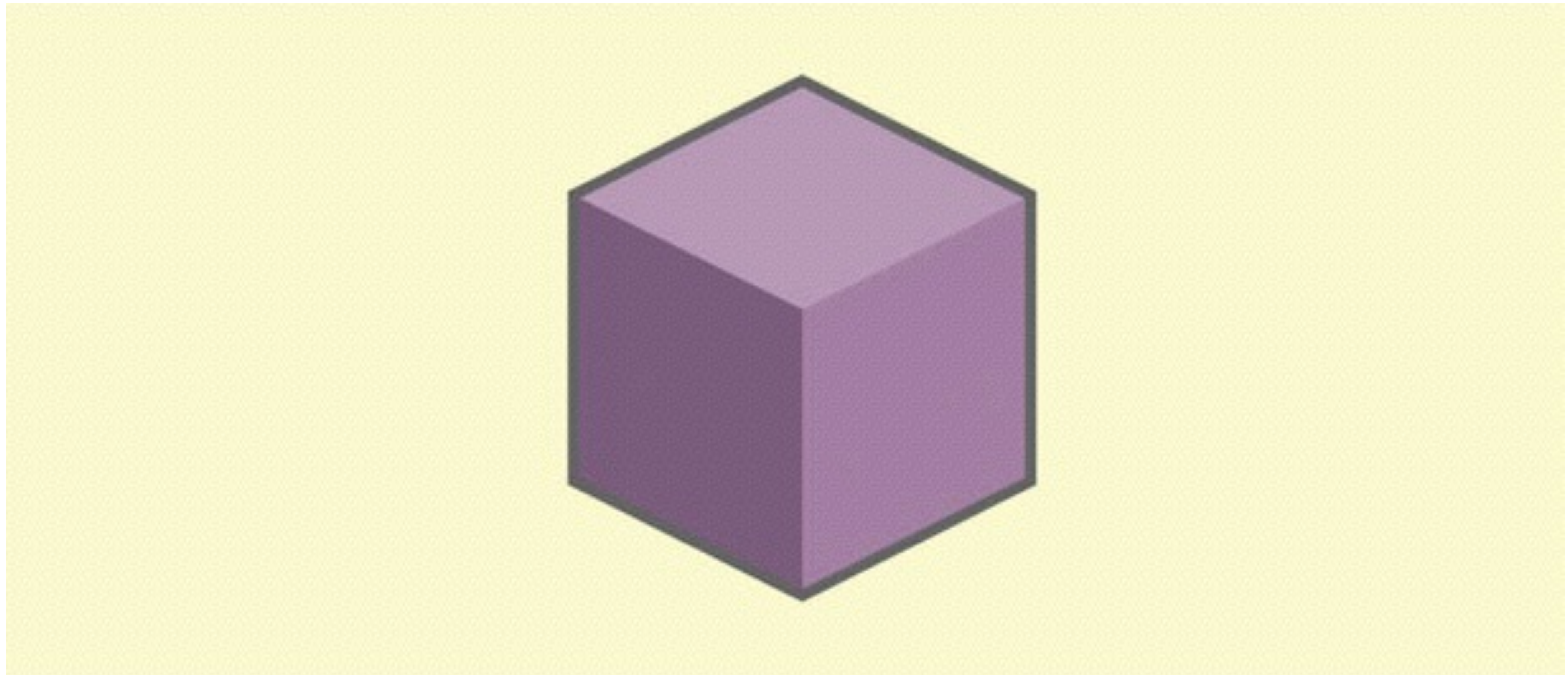
Considers volume, weight, and balance.

Creates perspective.

Believable movement.

11. Solid drawing





Appeal

Aesthetic refinement.

Considers formal
decisions.

Examples: Asymmetry is
more interesting.



12 Principles of Animation

Design Principles

Elements to Principles

Uses the elements of design (color, shape, line, type, etc).

The “assembly guidelines” that we can manipulate to organize or arrange the above.

How the elements are used is the root of design problems.

Alignment

Alignment is a strong way to create the appearance of order in a composition. If the edges or centers of several elements are positioned so that they appear to be in a consistent line, then we have aligned these elements.

Symmetry and balance

Symmetry creates the illusion that one half of an image (or a set of elements within it) is the reflection of the other half. Each element has a corresponding partner on the opposing side of the composition. Symmetry is one method of creating balance in a composition, but balance may also be achieved by pairing dissimilar elements, or partnering lone elements with groups of elements. For example, a composition that has a large circle at its upper left may be balanced by a cluster of smaller squares at the bottom right. Although the image is not symmetrical, balance is nevertheless achieved.

Direction

An element in an image sequence may appear to move in a given direction across the frame by means of animation, but static images can also possess direction via the strategic placement of tone, line, type, or shape. Single or converging lines can imply direction, as can shapes, such as triangles and arrows. Tonal variation, such as a transition from light to dark, may also lead the eye across the frame, creating direction. Type has an inherent direction—the direction in which it is read—but this path is not necessarily horizontal, left-to-right, as seen in the glut of recent **kinetic type** infographics.

Proportion

Proportion describes the relationships of relative height, width, depth, area, volume, distance, and (in our context of time-based design) duration. Effective and pleasing proportion is apparent even in a single element. A rectangle, for example, possesses a height-to-width relationship.

For many centuries, artists and designers have favored the ubiquitous proportion known as the *golden mean* (also known as the *golden section* or the *golden ratio*), which is a ratio of 1:1.618. The golden mean is evident in works of art and natural formations such as flowers, shells, and storms. It can also be found in the relative dimensions of our own limbs and faces.

Rhythm

Rhythm is created by the repetition of similar elements. Parallel lines separated by equal divisions, for example, can create a rhythm across a composition. Rows or columns of repeated shapes can create a pattern, which is a variation of rhythm. In time-based design, the appearance or disappearance of elements may also create a temporal rhythm.

Contrast

Contrast can be created by using opposing colors or tones, by alternating directions, or by extremes of scale. In general, it is a good principle to utilize high or low contrast in your composition: elements must be *perfectly similar* or *distinctly different*, because subtle differences may look like defects.

Position

Each elemental member of a composition must occupy a position relative to the boundary of the frame, and relative to each other. In addition, elements may appear to possess a position relative to the vantage point of the viewer. They may seem to be close or distant, depending on their scale or figure/ground relationships.

The extent to which elements appear to be grouped or separated is determined by position and the resulting residue of space. Adjacent elements will appear to be grouped or related; elements separated by a greater margin will appear disconnected or unrelated, unless they are similar in other ways.

Similarity

The extent to which elements are similar influences our perception of whether or not they are unified. Thus, two elements, segregated by other elements such as line or space, may appear to belong together if they have a common color, trajectory, or figure/ground index.

Figure/ground

In a two-dimensional image, all elements exist on a flat image plane; no element can protrude from the canvas and no image can recede beyond the image plane. *Figure/ground* describes the way in which one element may appear to sit above other elements on this plane. It is possible to create strong figure/ground relationships by using contrasts in tone or color, or by the implied continuation of partially hidden elements. For example, most viewers will assume that a solid square is obscured rather than dissected by a circle that sits on one of its corners.

Discord

Combinations of elements can be described as discordant if they appear to conflict (i.e., to disregard any of the other principles described here). Discord is usually undesirable—the consequence of poor composition. However, discord may sometimes be a conscious design choice rather than a mistake. For example, an asymmetrical image that has a lot of negative space on one side may appear to be an incomplete composition. But as we are dealing with time-based composition, this discord can create in the mind of the viewer anticipation that the balance will be restored. The desire for harmony will motivate the arrival of, say, text or graphics to fill the apparent void. Thus, with the selective use of discord, we have the potential to design-in tension.

Project 2

project 2: principles of motion graphics

explore how two or more animated elements can be choreographed to convey meaning

consider how supporting and contradictory motions influence your overall perception of the motion

give attention to the birth (arrive), life (live), and death (exit) of each principle

use sound as inspiration for visual expression and develop explicit relationships between sound and movement

Be imaginative and expressive!