Introductory

Animation Principles

Principles of Animated Motion
Inspiration

- Norman McLaren
  - Born in1914 in Stirling, Scotland. Died in Montreal, 1987.
  - NFB > Focus on Animation > Norman McLaren
    - McLaren 2014

Norman McLaren

- The National Film Board of Canada was founded in 1939.
- The British documentary film-maker John Grierson was appointed to be the first Head of the NFB.
- In 1941, Grierson asked his friend and colleague McLaren to join the NFB, to be in charge of producing short animated films for the war effort. McLaren had been working in England and New York, using direct animation (drawing directly on 35-mm film).
- At the Board, McLaren recruited young artists from across Canada to assist him, like George Dunning, Grant Munro and Rene Jodin. This group of individuals eventually became the animation department at the NFB.
- The early films were done very inexpensively with a minimum of means because of scarce resources due to the war, but the films were completed with charm and vitality.
- After WW II, the animators at the Board were able to focus their attention on more personal projects.

Norman McLaren

- After WW II, the animators at the Board were able to focus their attention on more personal projects.
- McLaren became recognized internationally for his innovative technical achievements:
    - Drawing on film - he made “Begone Dull Care” (1949) made with Eve Lambert, with music by the Oscar Peterson Trio
    - Pixilation - he directed/animated actors frame by frame in front of the camera
    - Animated sound - when he drew and photographed optical sound, for films like “Neighbours” (1952) and “A Chairy Tale” (1957) for example
- “Neighbours” won an Oscar in 1952.
- McLaren was very prolific, having made more than 60 short films before his death.

Principles of Animated Motion
Inspiration

- Norman McLaren:
  - Animation is not the art of drawings that move but the art of movements that are drawn.
  - What happens between each frame is much more important that what exists on each frame.
  - Animation is therefore the art of manipulating the invisible interstices that lie between frames.

Animation from A to B

A

B

Along a Motion Path



Along a Motion Path

An invisible line, that indicates the direction an object could travel from A to B

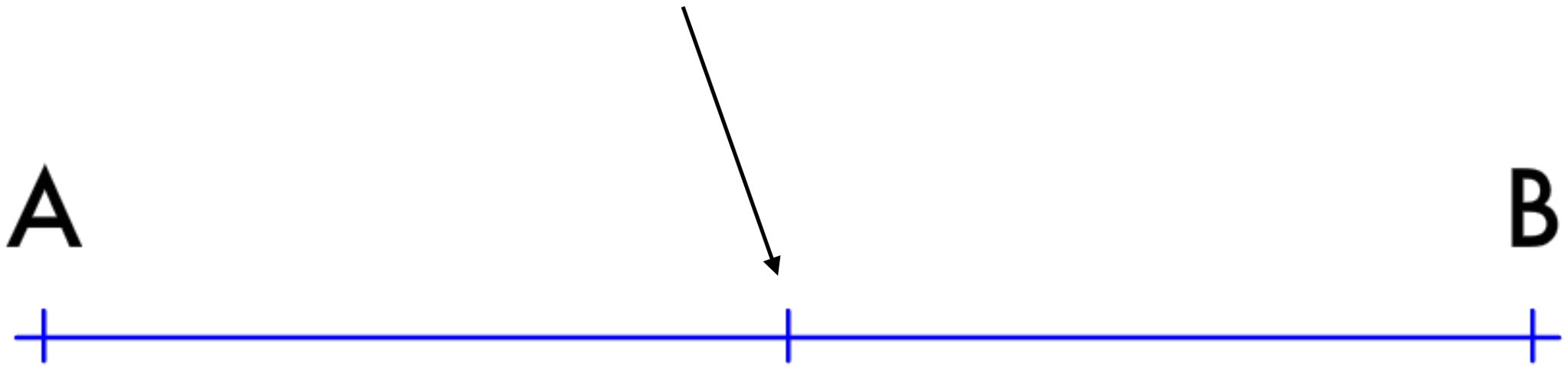


Motion Path

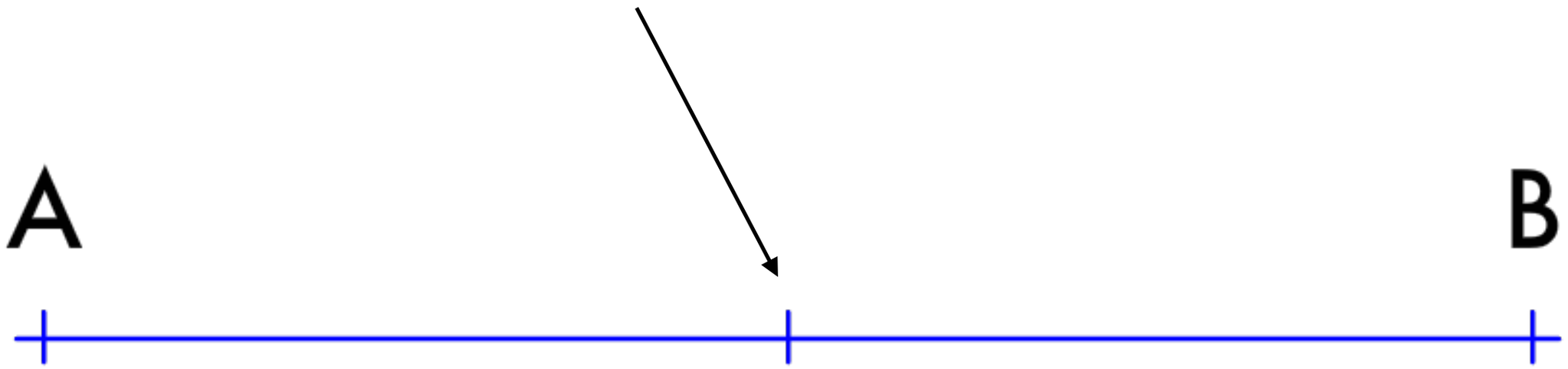
- By the way, motion paths don’t have to be straight.
- Most motion paths in life are not straight and have a curve to them.

Along a Motion Path

Set a calibration mark, to begin to figure out how a object might move between A & B

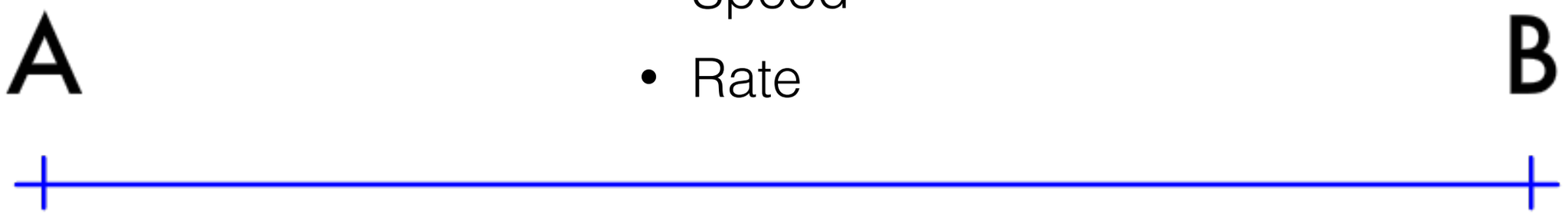


- A Calibration Mark
- A Move



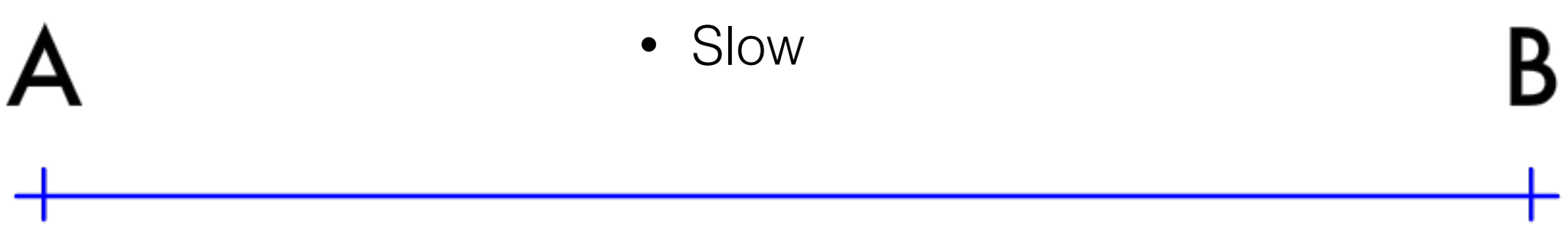
Tempo

- The amount of calibrations you set between A and B will determine the:
  - Tempo
  - Speed
  - Rate



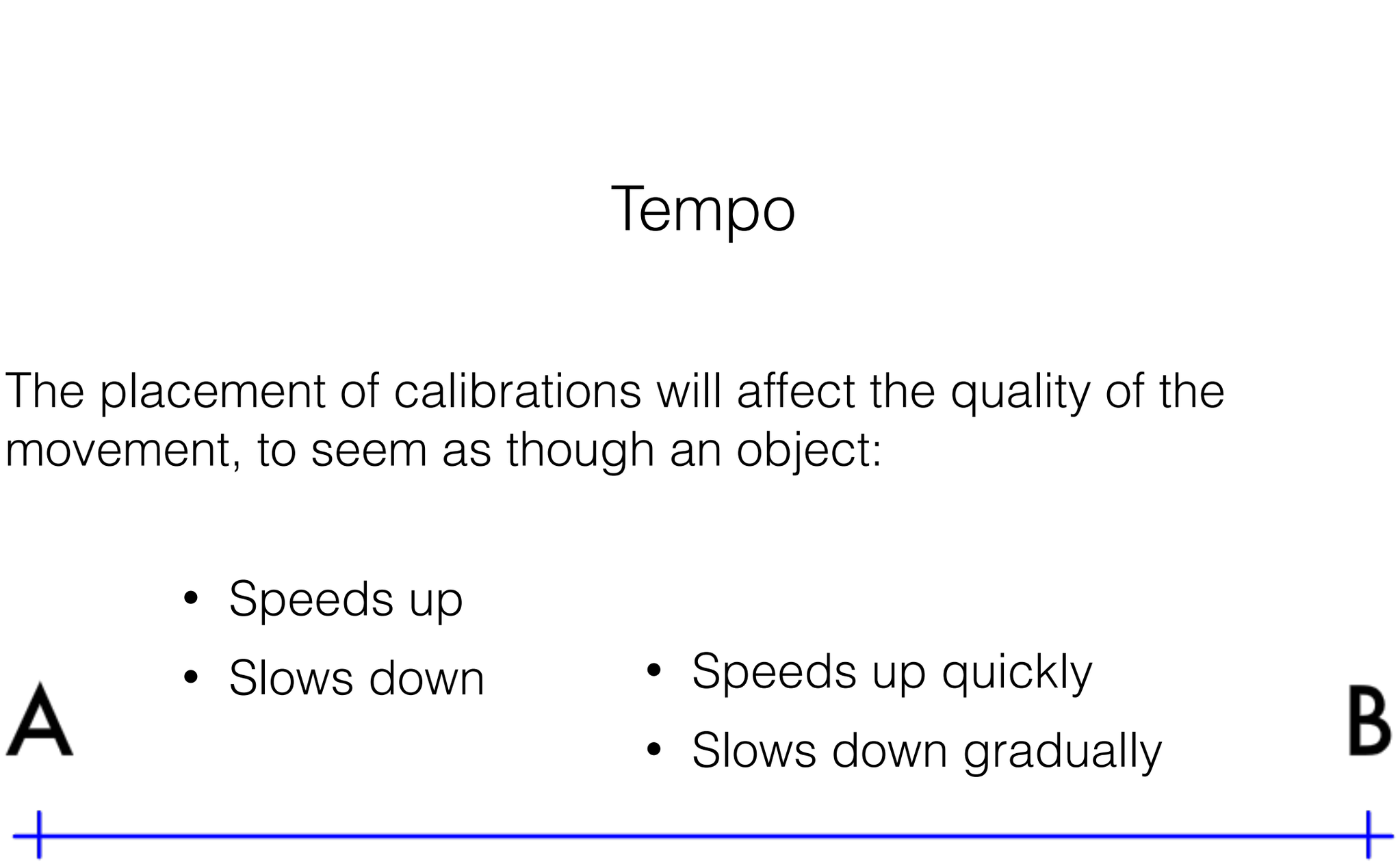
Tempo

- The amount of calibrations you set between A and B will affect the condition of the movement, to be:
  - Quick
  - Slow



Tempo

- The placement of calibrations will affect the quality of the movement, to seem as though an object:



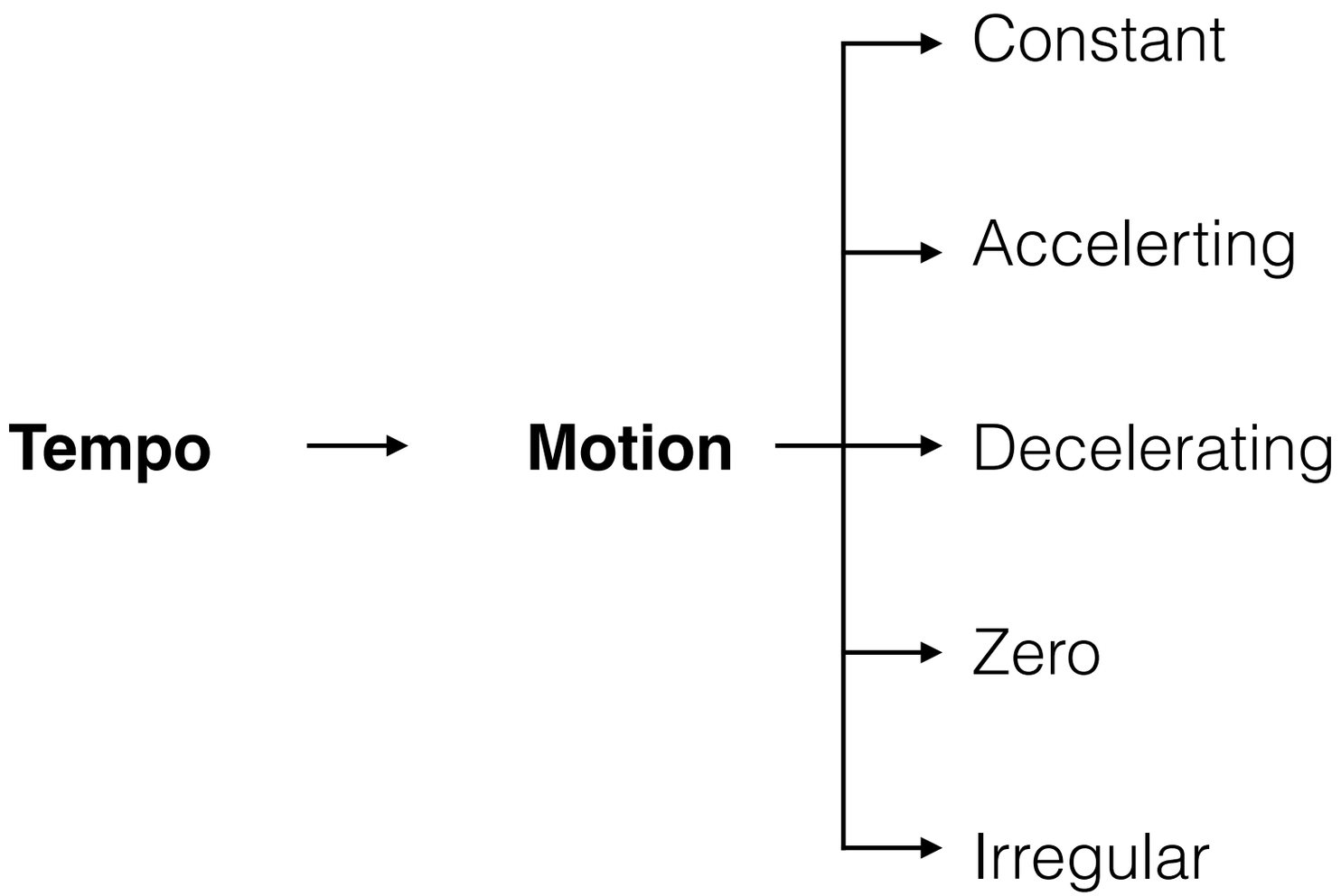
- Speeds up
- Slows down
- Speeds up quickly
- Slows down gradually
- Is calm
- Is frenetic
- Rests
- Etcetera

Tempo

Timing & Spacing



Elements of Animated Motion



Constant Motion

Constant Motion

- Each move is equidistant. The spaces between calibrations are equal.

- More moves with calibrations spaced closer together will make slower movement.

- Fewer moves with calibrations spaced farther apart will make quicker movement. But, be careful, there is a consequence to that!



3 Moves



6 Moves



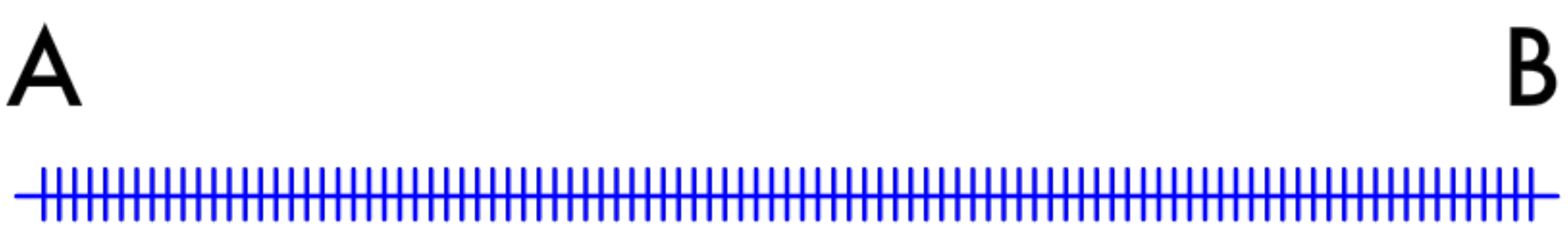
12 Moves



24 Moves



48 Moves



96 Moves

Acceleration

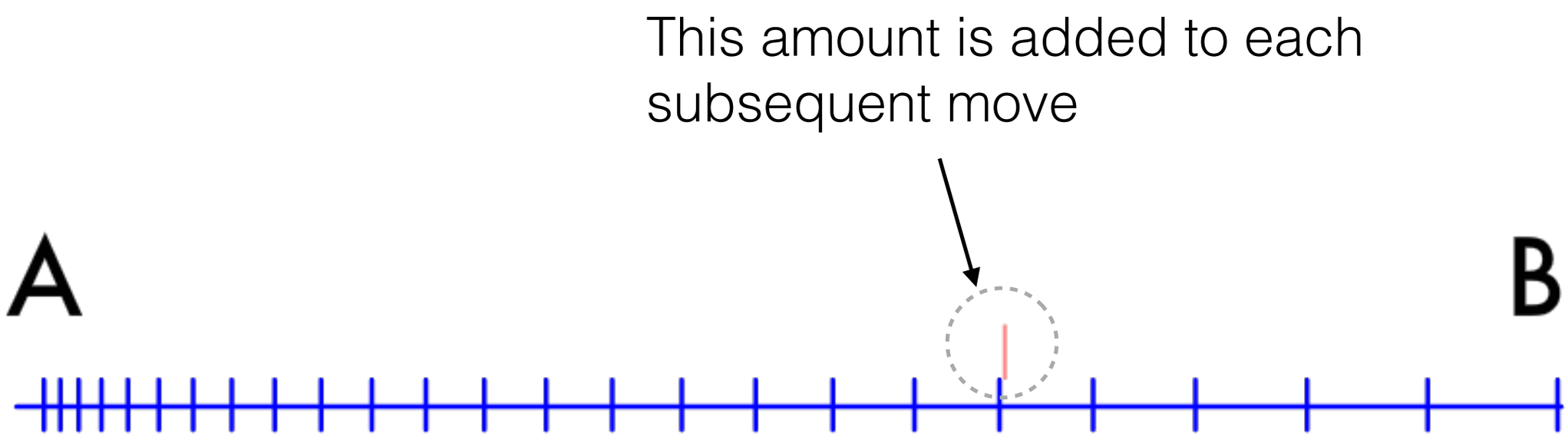
Acceleration

- The distances between moves increase.
- Each move is progressively greater.
- The amount of difference can dramatically affect the nature of the motion, e.g., steep or gradual.

Example of Gentle Acceleration



Example of Gentle Acceleration



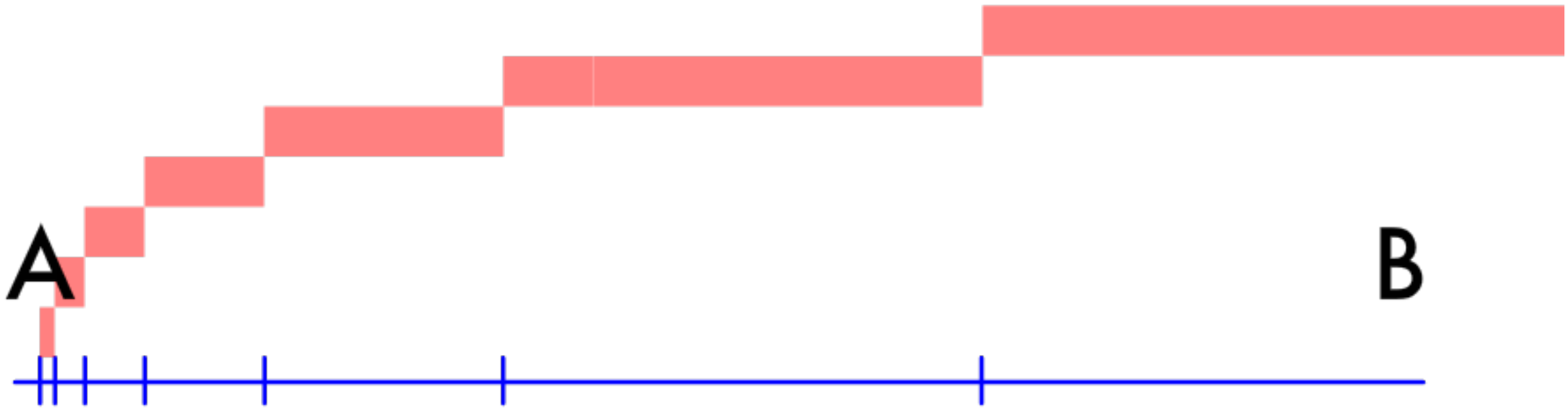
Move + Set Amount = Gently Accelerating Amount

Example of Steep Acceleration



Example of Steep Acceleration

- Each subsequent move doubles
- The increases are exponential



Move x 2 = Steeply Accelerating Amount

Deceleration

Deceleration

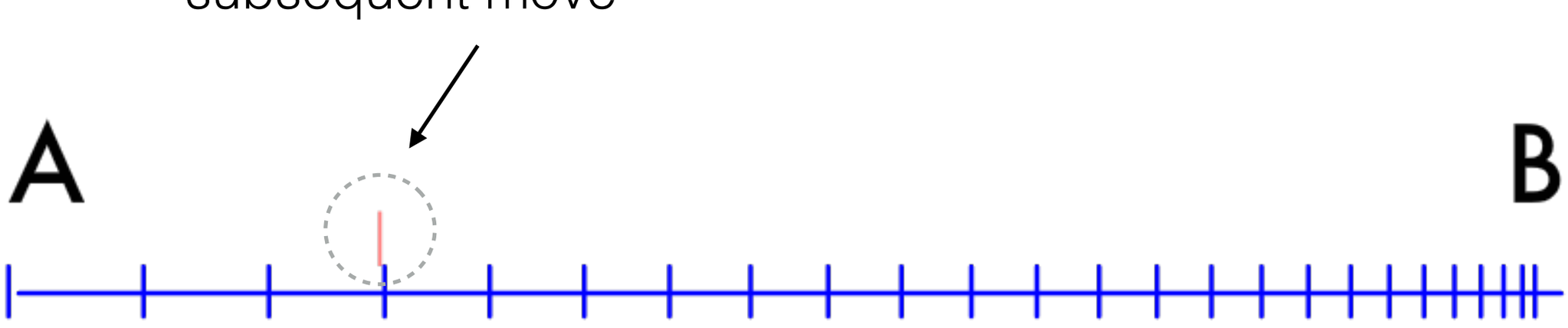
- The distances between moves decrease.
- Each move is progressively less.
- The amount of difference can significantly affect the nature of the motion, e.g., steep or gradual.

Example of Gentle Deceleration



Example of Gentle Deceleration

This amount is added to each subsequent move



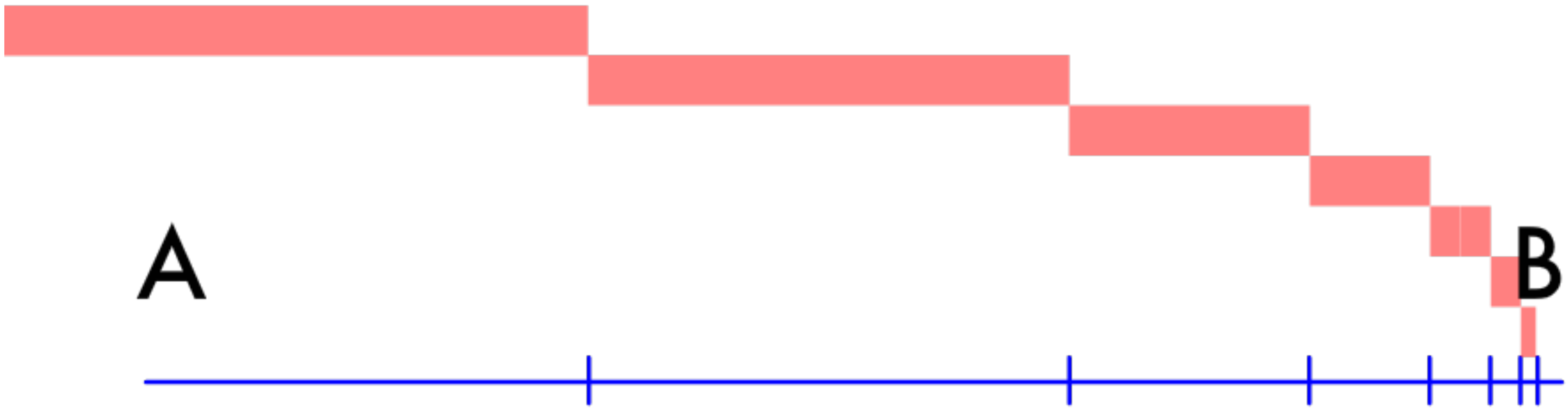
Move - Set Amount = Gently Decelerating Amount

Example of Steep Deceleration



Example of Steep Deceleration

- Each subsequent amount decreases by half
- The decreases are exponential

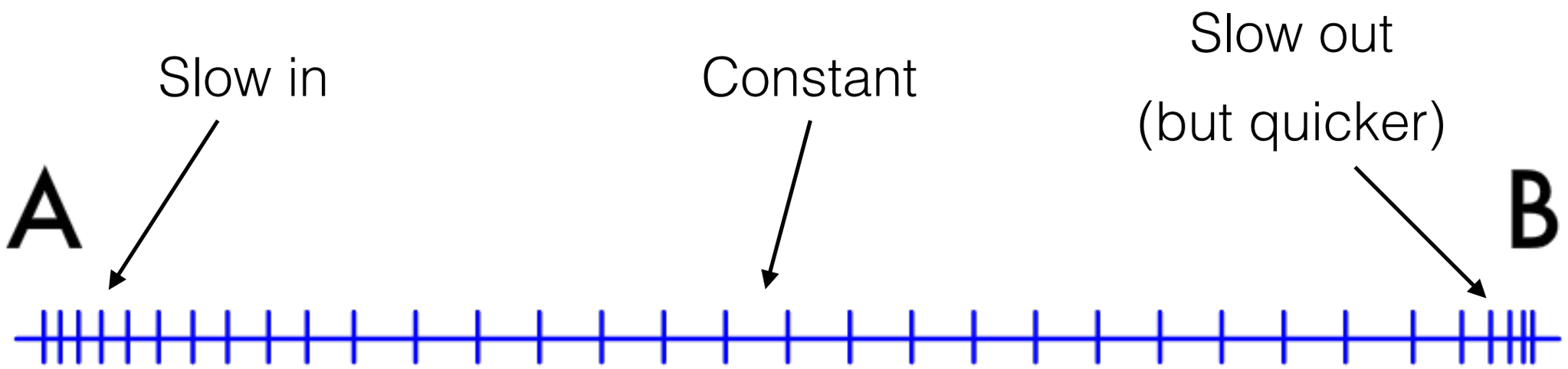


Move ÷ 2 = Steeply Decelerating Amount

Accelerating & Decelerating Motion

- Cushions, Eases, Tapers:
  - A combination of accelerating and decelerating motion
  - “Slow in” or “Taper in” or “Ease in”
  - “Slow out” or “Taper out” or “Ease out”

Example of a Compound Movement



Zero Motion

Zero Motion

- Also known as a hold or rest.
- This is very important tempo!
- Holds/rests will range from one-frame per move:
    - Move + Hold, Move + Hold, Move + Hold, etc. = Double frame animation (12 images per second)
- To 1, 2, 5, 10 second holds.
- In life, these would be natural rests

Frame Rates

- 24 frames per second (fps)
  - Single-frame animation
  - On "ones"
- 12 images per second
  - Double-frame animation
  - On "twos"

Examples of Rests & Holds

Seconds	Frames
1/24	1
1/12	2
1/4	6
1/2	12
1	24
2	48
3	72
4	96
5	120
10	240

Examples of Rests & Holds

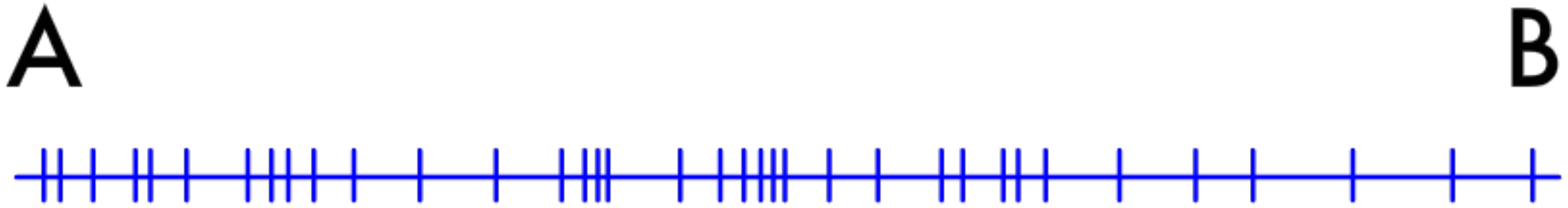
Minutes	Frames
1/2	720
1	1440
3	4320
5	7200
10	14400
22	31680
30	43200
60	86400
90	129600
120	172800

Irregular Motion

Irregular Motion

- Combines aspects of the other tempos, including zero motion or holds.
- Creates important, believable features:
    - Jittery
    - Nervous
    - Shudders
    - Etcetera
- Movement that is not smooth!

Irregular Motion



Principles of Animated Motion

- Film Example:
  - EatPES
  - "The Deep"
  - www.eatpes.com/the_deep.html