Animation

Why animation?

- Realism and fluidity of interaction
  - Open/Close
  - Spring-back constraints
- Transitions from collaborators
  - System
  - Other people
- PowerPoint
  - Actual Animation effects

Basic linear transform

- Setup, V0 at T0 and V1 at T1
- Linear transform
  - $V = a*T + b$
  - Derive the equation using V0,T0,V1,T1
- Equation
  - $a = (V0-V1)/(V0-T1)$
  - $b = V0-T0(V0-V1)/(T0-T1)$
- Why use it?
  - Keyframe animation

Animation Schedule

- Animation Record
  - Value reference (path from root)
  - V0, V1, T0, T1
- At some time T for each rec in schedule
  - If (rec.T1<T)
    - V = V1, discard rec
  - Else if (rec.T0<T)
    - V = V(T)   *(a*T+b)*
- Increment T by 1/30
  - If (T<realTime)
    - T=realTime
  - Else if (T>realTime)
    - Wait(realTime-T)

Expressing Animation

- Consider a presentation list in SPARK

Entrance

Appear	Fade	Fly In	Float In	Split	Wipe	Shape
Wheel	Random Bars	Grow & Turn	Zoom	Swivel	Bounce	

Emphasis

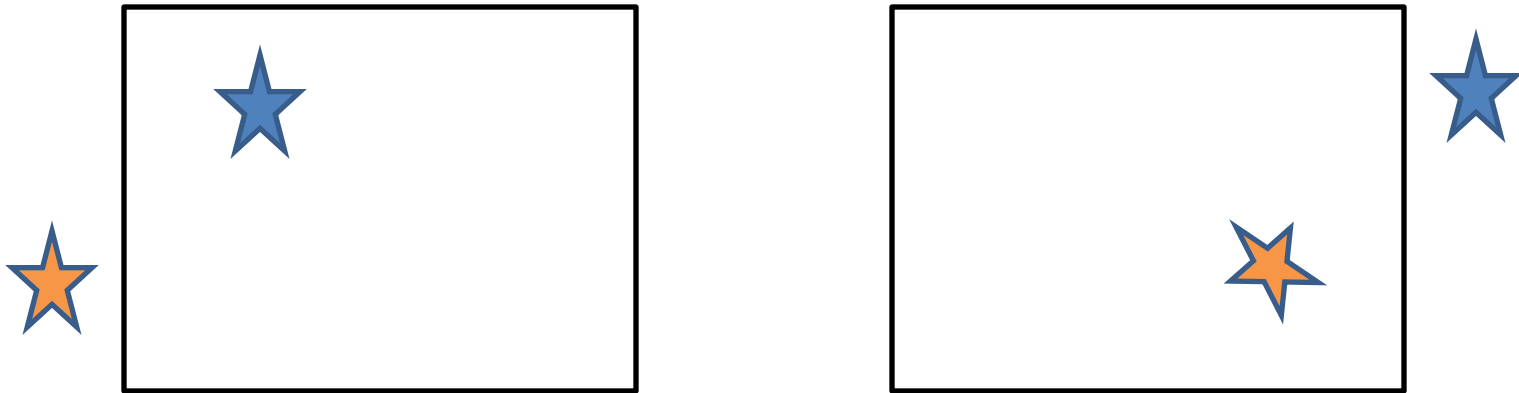| Pulse	Color Pulse	Teeter	Spin	Grow/Shrink	Desaturate	Darken
Lighten	Transparency	Object Color	Complementa...	Line Color	Fill Color	Brush Color
Font Color	Underline	Bold Flash	Bold Reveal	Wave		

Expressing Animation

- Keynote on iPad – Two different slides + time

Expressing Animation

- Keynote implementation
  - Difference on the two presentation trees
    - Diff(P1, P2) => Change list
  - Generate an animation schedule for each change
    - Number change
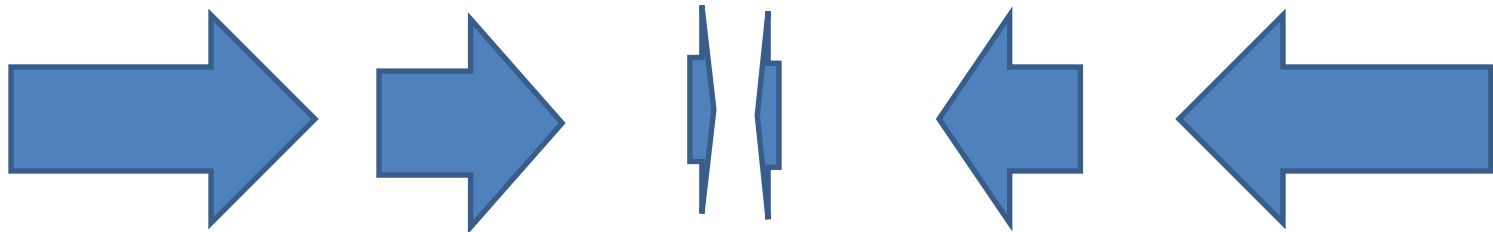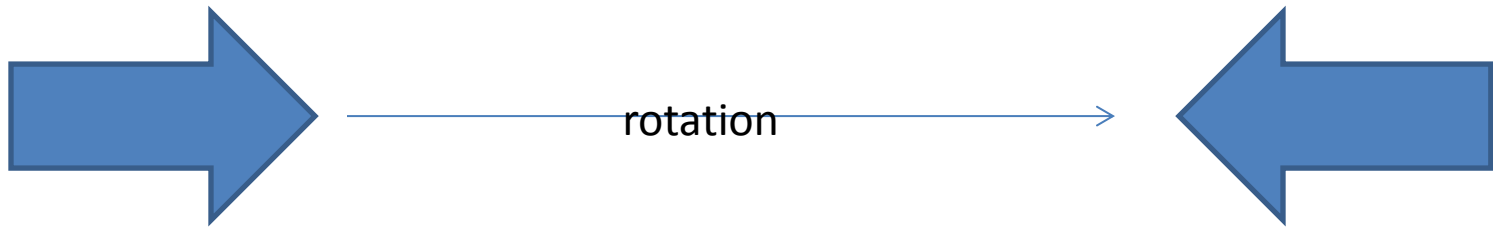   - Creation
    - Deletion
    - Movement in a list?
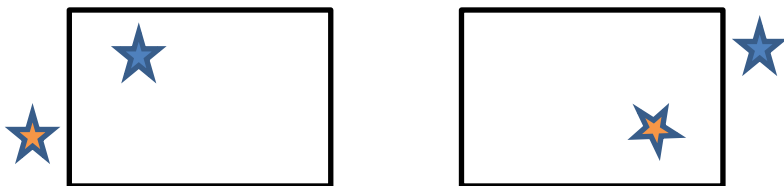
Alternate V(T) functions

- Distance time curve
- Cubic slow in slow out

  $s = -2t^3 + 3t^2$ (0-1)

- Derive V(T)
  - $V = s(V1-V0)+V0$
  - $t = (T-T0)/(T1-T0)$
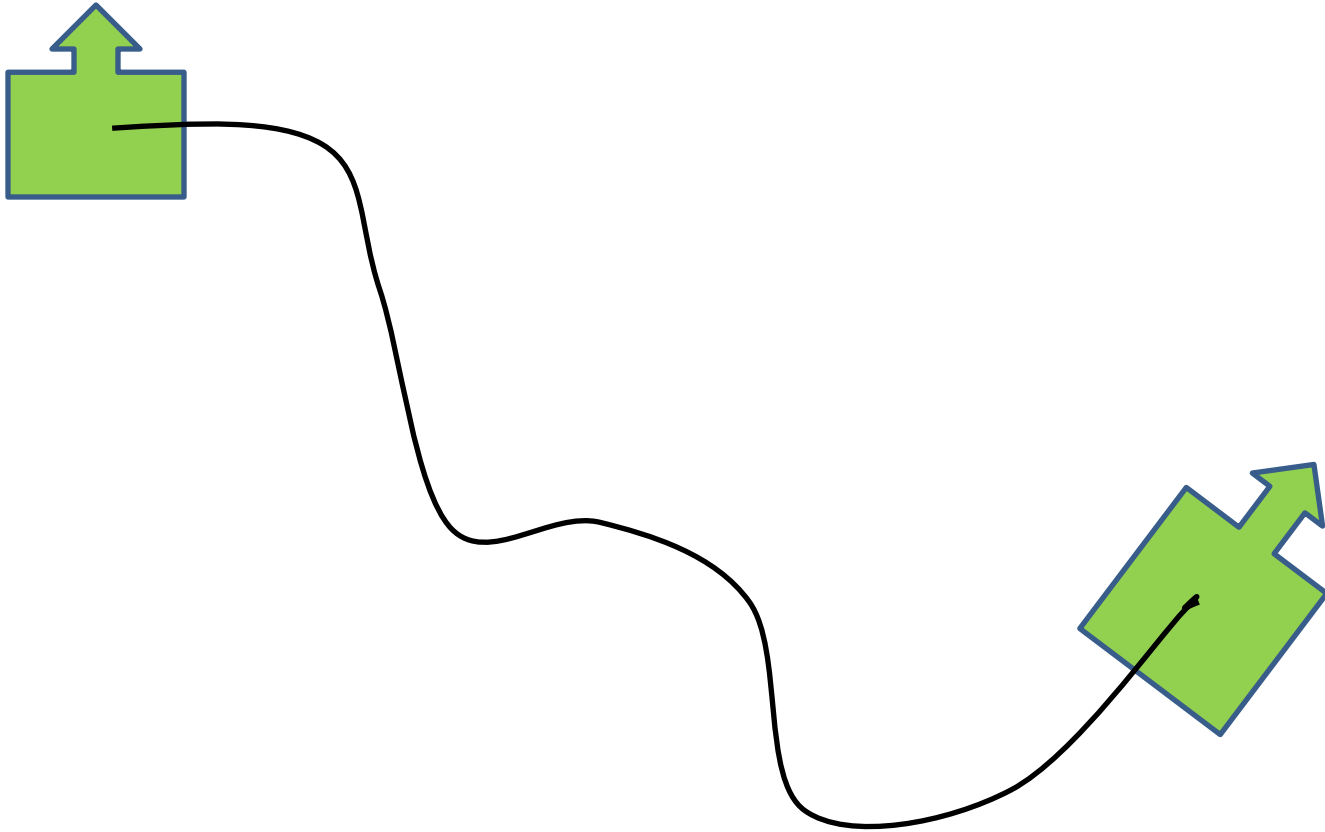 - Modify for slow in only
  - Modify for slow out only

1.0

0.0

0.0   time   1.0
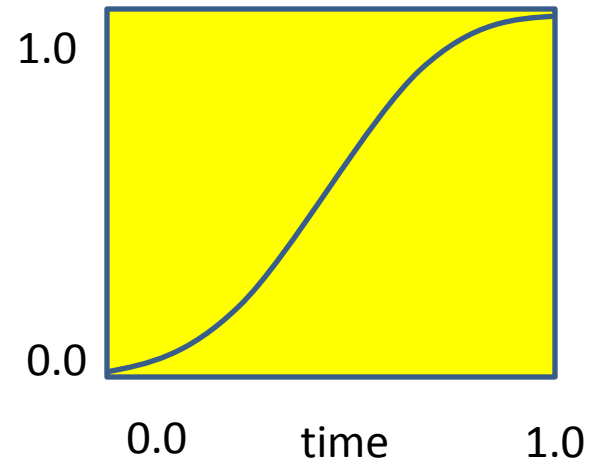
Animating Transformations

rotation

Simple Slow in

- $V_{i+1} = V_i (1-R) + V1(R)$

  – R varies between 0 and 1 and controls the rate

Movement Path

Movement Path