

# Timeline and Stage

current picture consists of 3 layers

Playback head

3 layers in parallel

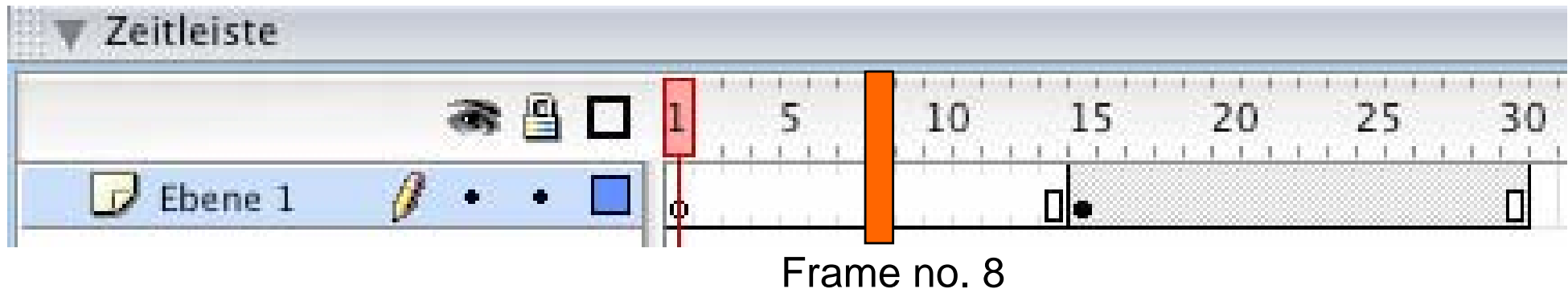
Frame change

Stage shows current frame

3 dimensions (2 plane dimensions plus time) mapped to 2D screen:

- 2D-frame (stage), no time
  - time plus layers, no frame content
- } combined

# Timeline Symbols

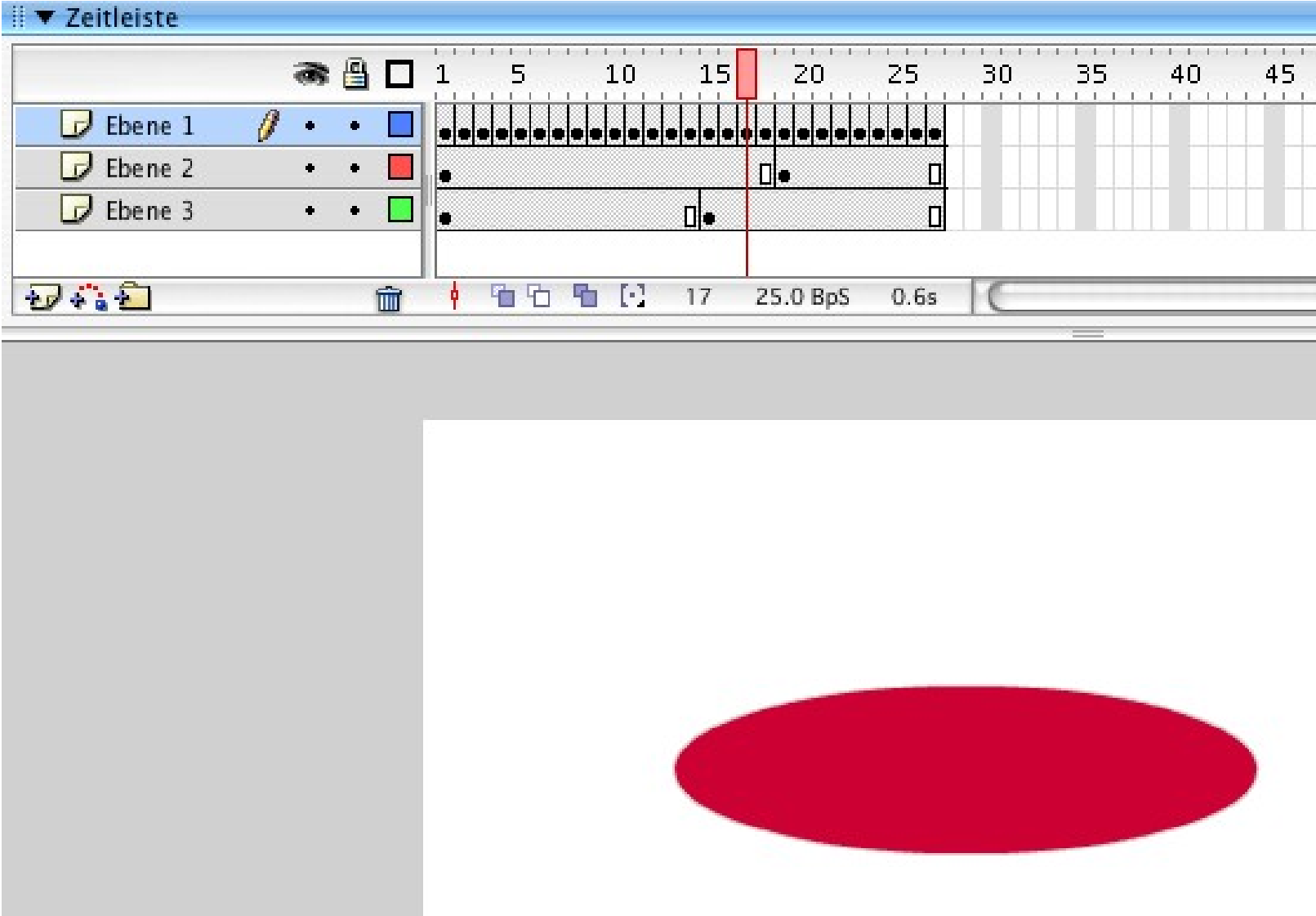


- The timeline contains of *frames* (Bilder)
- *Key frames* (*Schlüsselbilder*) are defined explicitly (drawn by hand)
  - Representation in Flash:
    - hollow dot = empty key frame
    - black dot = key frame with content
- Default treatment of frame sequences: repeat last frame
  - Grey bar: Sequence of identical frames
  - Square: Last frame of a sequence
  - Changes in key frame affect all subsequent frames till next key frame!

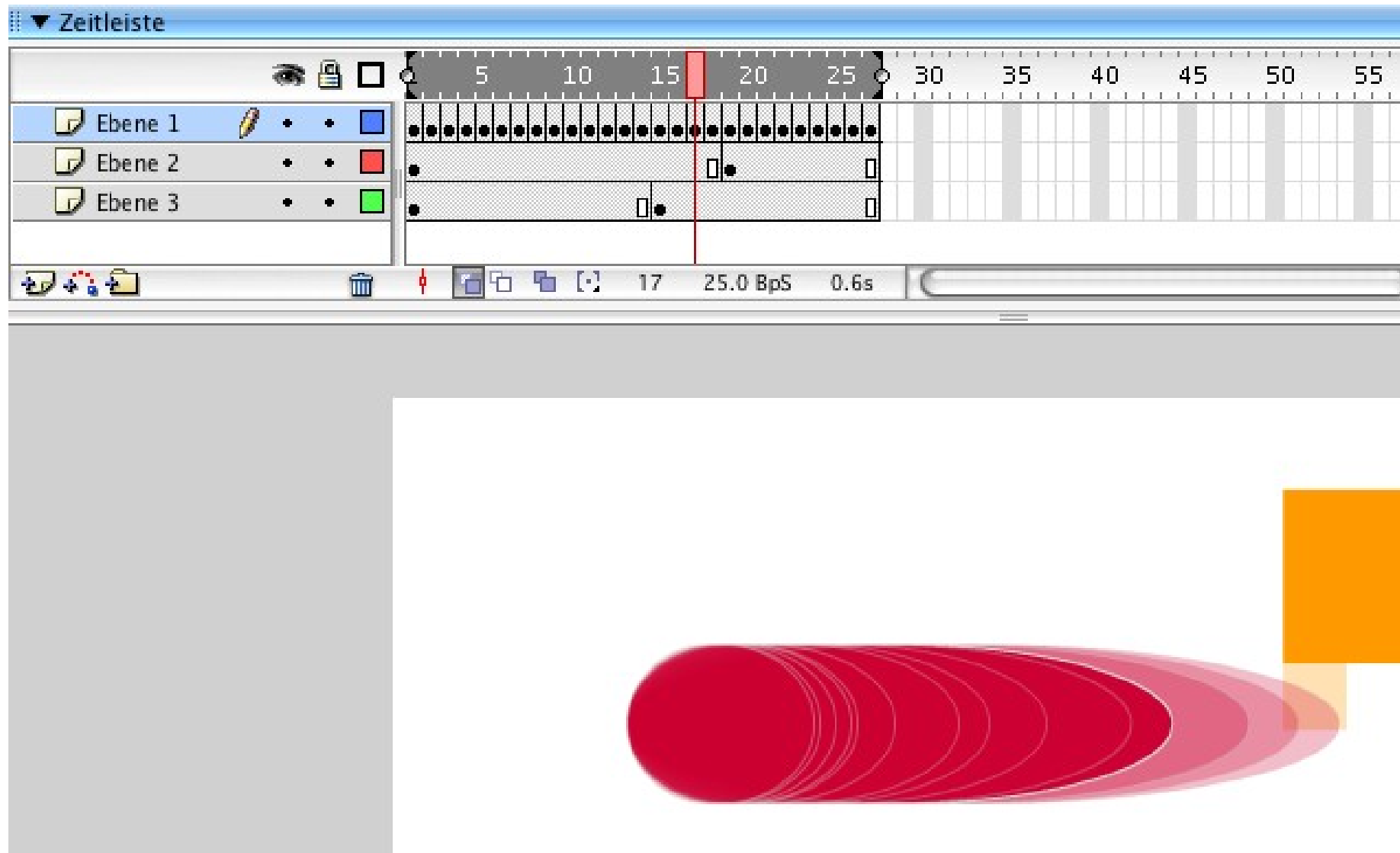
# Animation: Change of Pictures over Time

- The suggestion of continuous change or movement:
  - Created by small changes from picture to picture
  - At least 12 frames per second, better more (25 and more)
- Single picture animation:
  - One graphic picture (drawn by hand) per frame
  - In Flash: Sequence of key frames
- Interpolation (*tweening*):
  - Sequence of frames defined by first and last frame
  - “In-between frames” generates automatically (interpolated)
  - “Tweening” possible with respect to several properties
    - » Size, location, orientation, colour of individual object (*motion tweening*)
    - » Shape of object (*shape/form tweening*)

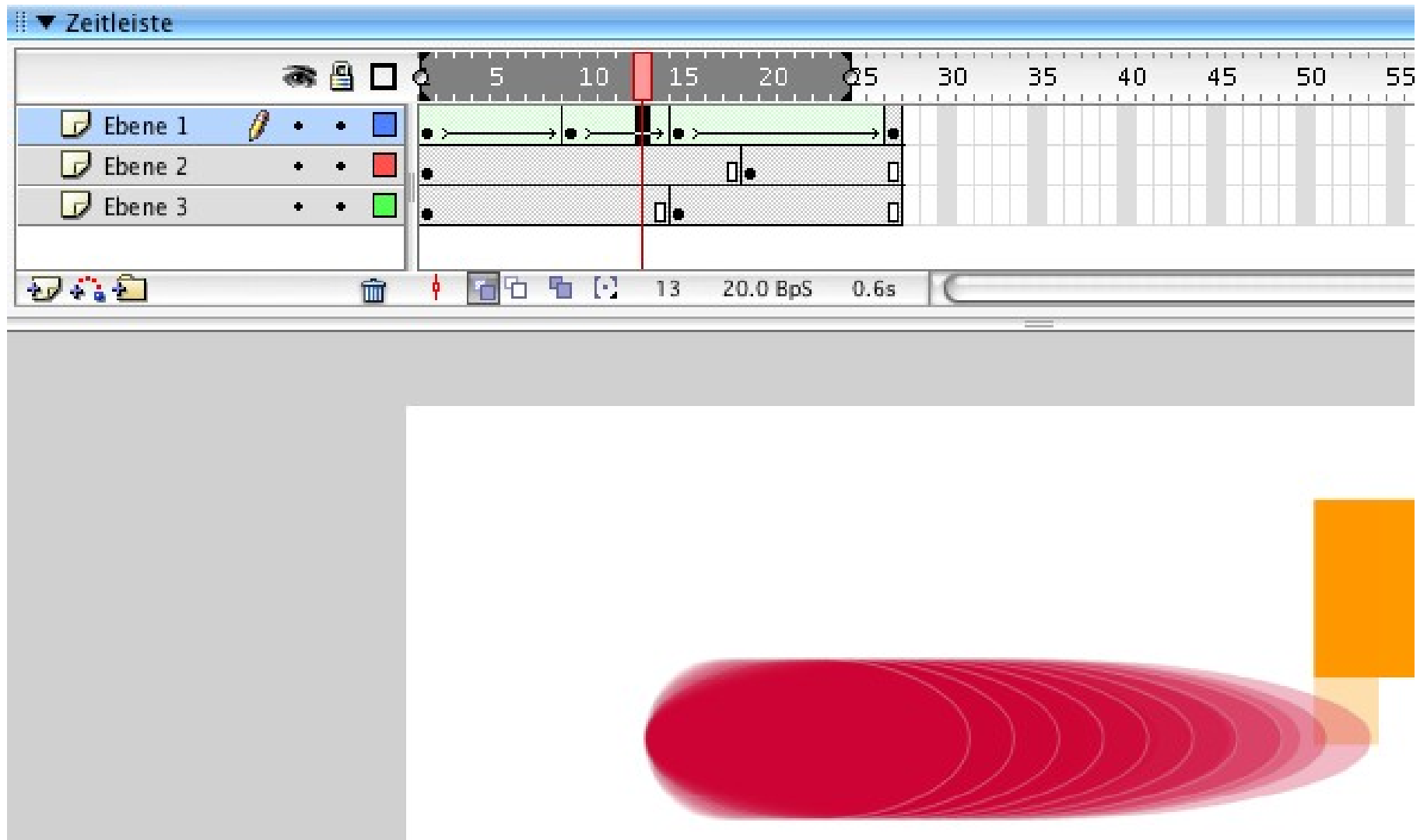
# Keyframe Animation



# Visualization of Animation with “Onion Skins”



# Interpolation with Shape Tween

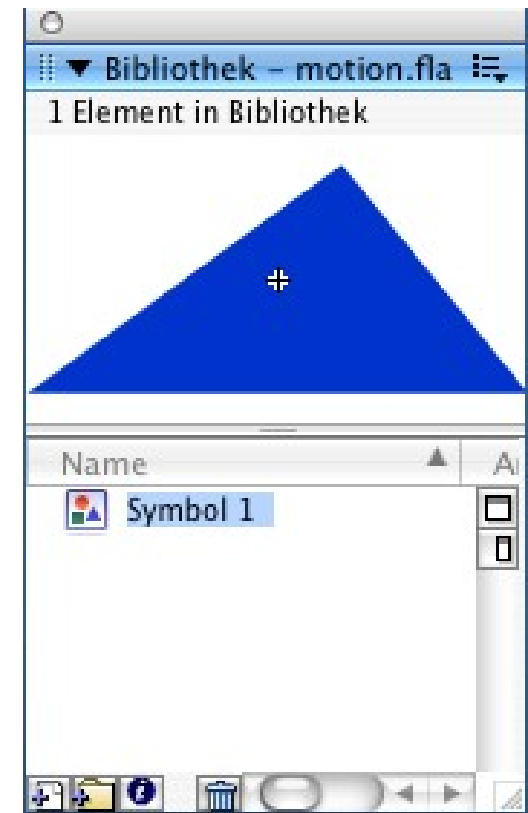
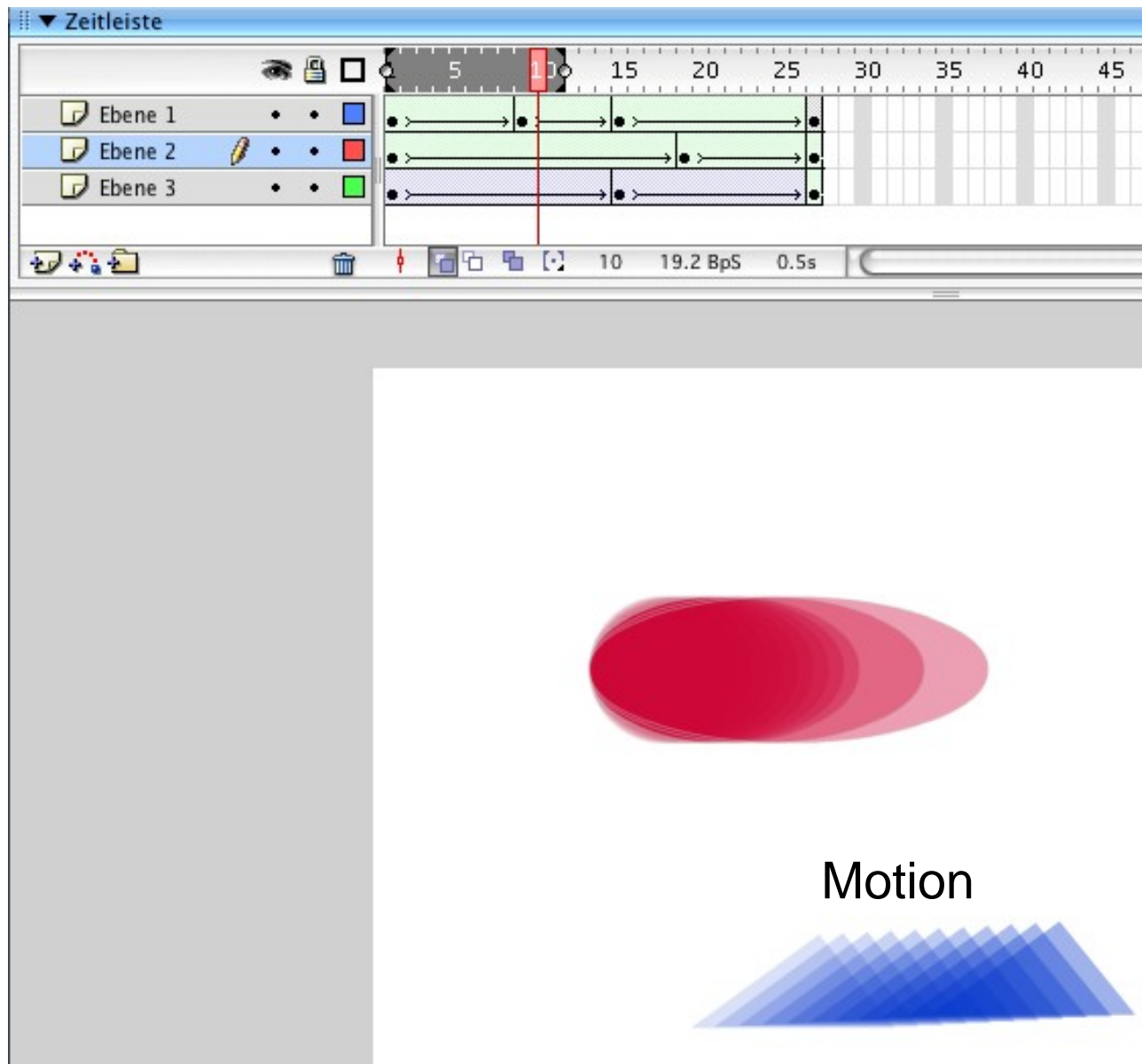


Only a few frames are drawn by hand, intermediate frames are interpolated

# Symbols and Instances

- *Symbol*: Reusable element in a Flash animation
  - Contained in Library
  - Examples: Graphics, Buttons, MovieClips, Sounds
- Dragging a symbol onto stage creates an *instance* of the symbol
  - Helpful for reduction of memory requirements
  - Essential for tracking objects in complex animation sequences
- Motion tween:
  - Only applicable to symbols
  - Imported graphics needs to be converted to a symbol before being used in motion tweens
- Strict distinction in Flash:
  - Shape tweens: Applicable only to simple graphical objects
  - Motion tweens: Applicable only to instances of symbols (or groups)

# Motion Tween

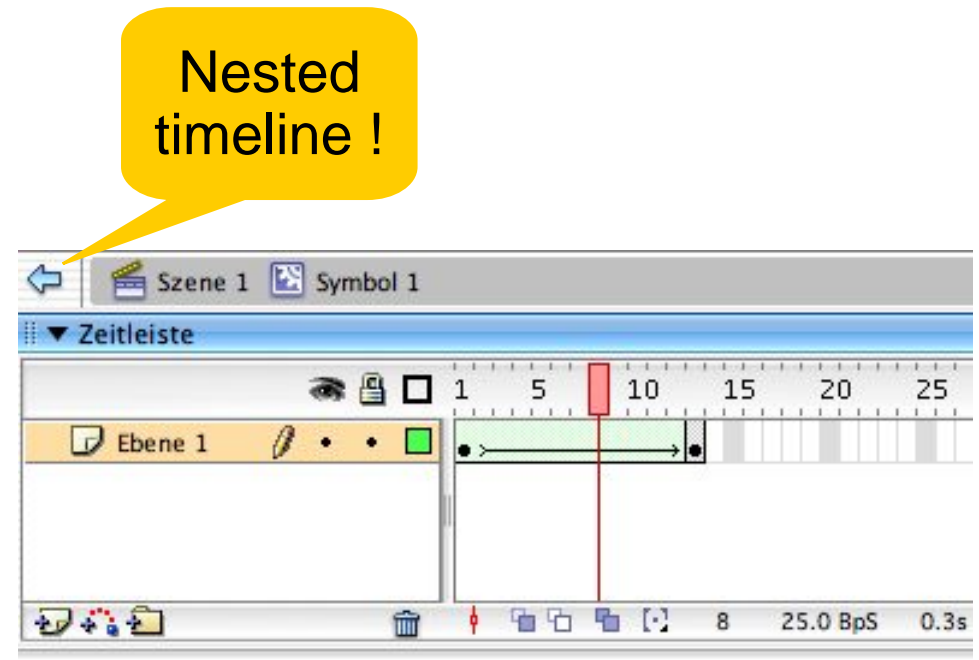


“slow down” and  
“speed up” adjustable  
through object inspector

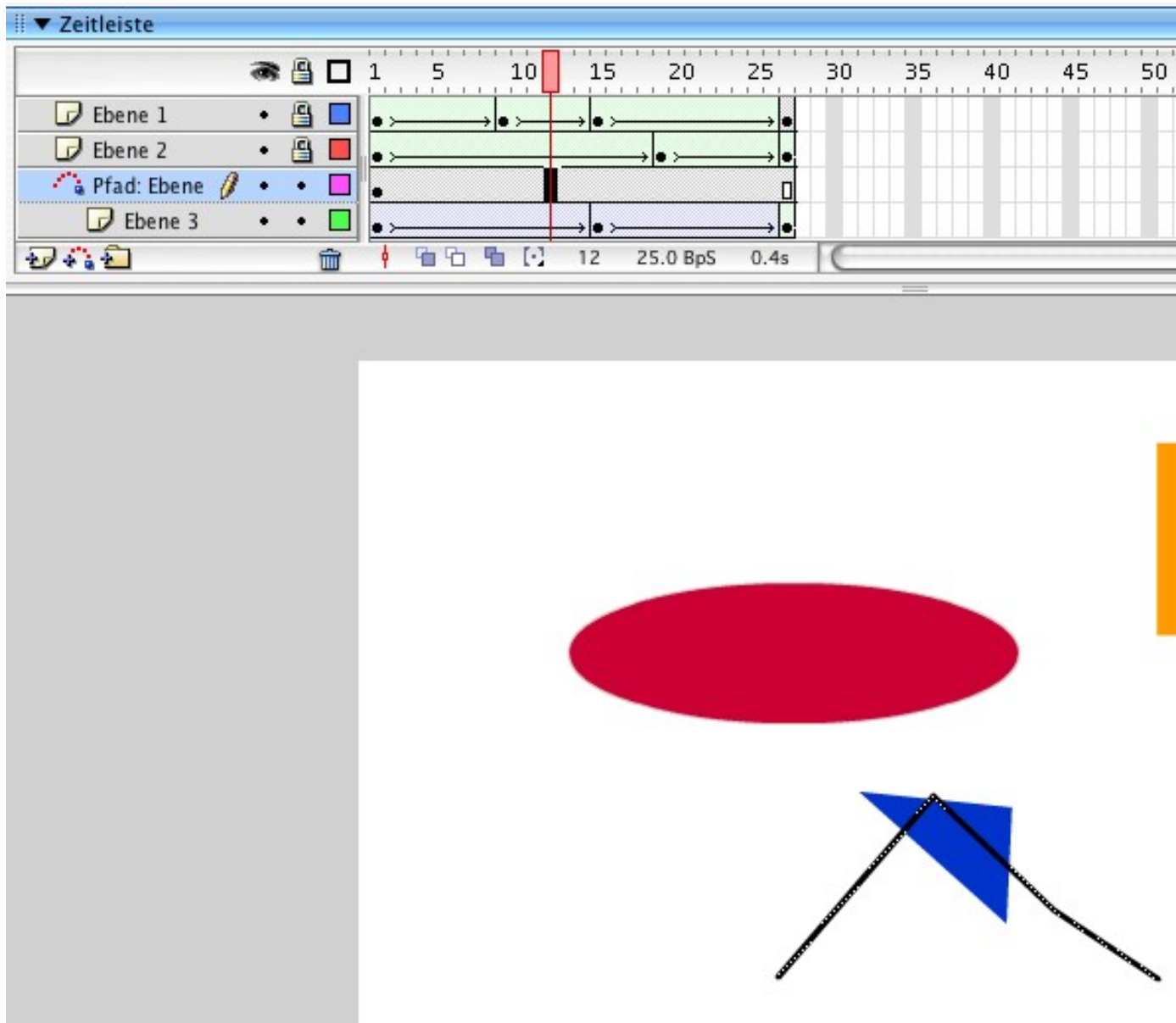


# Hierarchical Timelines

- Each object can bring its own timeline
  - Instances of library symbols bring a copy of the timeline defined for the symbol
- Main timeline may be structured hierarchically into a tree of timelines
- Each instance of a symbol can move individually through its timeline
  - ActionScript code (see next lecture) can be added to navigate within timeline



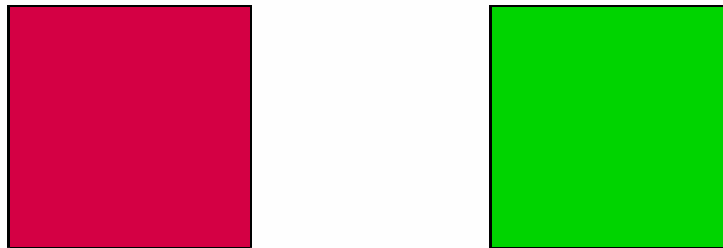
# Motion Path



- Motion of objects can be carried along specific lines
- Prerequisites:
  - Path layer inserted above motion tween
  - Respective attribute set in motion tween parameters (object inspector)

# Animation of Colours

- The same graphical object can be represented with various colour variants
  - Fill colours, line colours
  - Transparency (alpha)
  - Brightness (luma)
- Flash:
  - Colour changes possible in motion tweens and shape tweens
- Example:
  - Change colour of a square from red to green with interpolation



# Representation of "Tweens" in Flash

