Timeline and Stage

The current picture consists of 3 layers:

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

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

Tween (interpolating animation)

motion tween

shape tween