Animation

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CPSC 533
Nov. 25, 2009

Three papers:

- Animation: Can It Facilitate?
  Barbara Tversky et al., Int. J. of Human Computer Studies
  - **Or, "*Animation*, huh, yeah. *What is it good for?* Absolutely nothing."**
- Principles of Traditional Animation Applied to Computer Animation
  John Lasseter, SIGGRAPH '87.
  - **Or, "How to look at women and sports cars."**
- Interactive Visualization of Genealogical Graphs
  Michael McGuffin and Ravin Balakrishnan. Proc. InfoVis 2005.
  - **Or, "Incest throws a wrench into things!"**

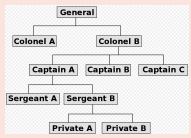
Animation: Can it facilitate?

- Review paper, circa 2002
- Seeks to address the following question:

"This animation thing seems to make sense and everyone's pretty excited about it, but does it really help?"

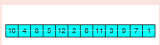
Animation: Can it facilitate?

- (Static) graphics are pretty great for things which are:
  - inherently visuospatial (e.g. maps)
  - metaphorically visuospatial (e.g. Org. chart)



Animation: Can it facilitate?

- So, animation should be naturally great for visuospatial things which vary in time
- E.g. complex machinery or CS data structure.
- Has this theory been borne out in practice (a.k.a. "the literature")?



Animation: Can it facilitate?

- Review is in three sections:
  - Incomparable content
  - Incomparable procedures
  - Failures of animation to benefit
- Take home message: Everything is hopelessly confounded by extra information, interactivity, etc.

Animation: Can it facilitate?

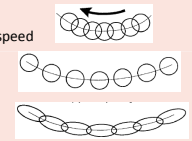
- A telling quote:
- "The continuous animation depicted all the lower level actions, while that information had to be inferred from both of the other graphics."
- If a medium is so well-suited to showing these lower level actions that they keep entering the studies, maybe that's not a bad thing?

Principles of Trad. Animation

- Time for some fun!
- Framed in terms of character animation, but still applies to visualization
  - We're still telling a story
  - We face the same limitations of audience perception as animators do
- Lists 11 key principles, mention a few here

Principles of Trad. Animation

- Squash and stretch
  - Maintain volume
  - Accentuates sense of speed
  - Prevents strobing



Principles of Trad. Animation

- Timing
  - Keep audience's attention
  - Gives feeling of weight to objects
- 3 stages:
  - Anticipation of the action
  - The action itself
  - Reaction to the action (follow through and overlapping action)
- Recall "Animated Transitions in Stat. Data Graphics"

Principles of Trad. Animation

- Timing: Inbetweens ("tweens") are frames between the start pose and end pose
- NO inbetweens: The Character has been hit by a tremendous force, his head is nearly snapped off.
- FOUR inbetweens: The Character is giving a crisp order, "Get going!" "Move it!"
- SIX inbetweens: The Character sees a good looking girl, or the sports car he has always wanted.
- TEN inbetweens: The Character stretches a sore muscle.

Principles of Trad. Animation

- Slow In and Out
  - i.e. 2nd and 3rd order continuity of motion
  - Use splines
  - Expressivity
  - Make things easier to follow

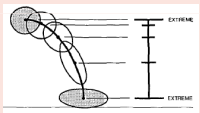


FIGURE 9. Timing chart for ball bounce.

Principles of Trad. Animation

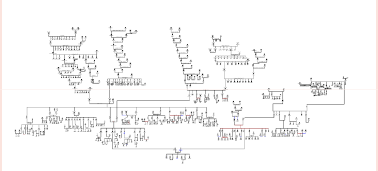
- Arcs
  - Very few things in nature move in straight lines
  - Arcs make animation smoother and less stiff
  - Again, use splines

Principles of Trad. Animation

Russ' Notes:

- Be careful when applying these principles to visualization
  - Mostly involve distorting "true" poses.
  - If tweens may be treated as data points, this won't work!
  - Be clear that only "poses" are "real"

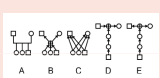
Vis. Of Genealogical Graphs



Graph of an actual family, 600+ people over 400+ years

Vis. Of Genealogical Graphs

- Variety of different representations
- E.g. "marriage node"
- Possibly multiple marriages per person



Vis. Of Genealogical Graphs

Problems

- Long edges (close relatives drawn far away)
- Edge-crossings
- Crowding
- Intermarriage (pedigree collapse)
  - Type 1 (consanguine): spouses are also cousins
  - Type 2 (conjugal): cycle containing another marriage
  - Might not be able to draw generation on one line

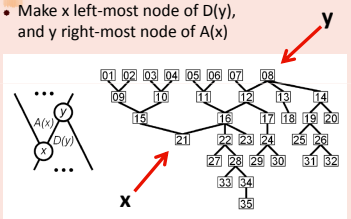
Vis. Of Genealogical Graphs

- Hourglass chart: ancestor tree and descendant tree from same node

- Dual tree: ancestor tree and descendant tree from different nodes

Vis. Of Genealogical Graphs

- Make x left-most node of D(y), and y right-most node of A(x)



Vis. Of Genealogical Graphs

- Used staged animation to manage transitions
  - Fade out nodes no longer needed
  - Move new “x” or “y”
  - Fade in new nodes
  - Staging makes it easier/possible to track the moving nodes as clutter is reduced

Vis. Of Genealogical Graphs

Animation

- Questions?