





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!”***

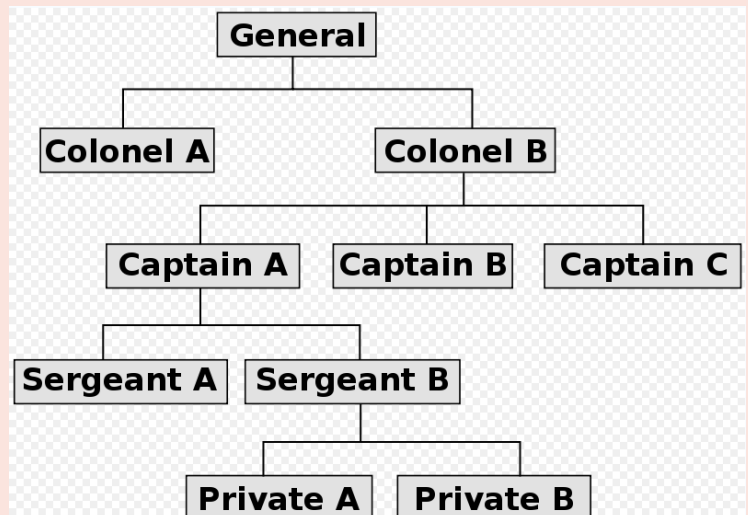
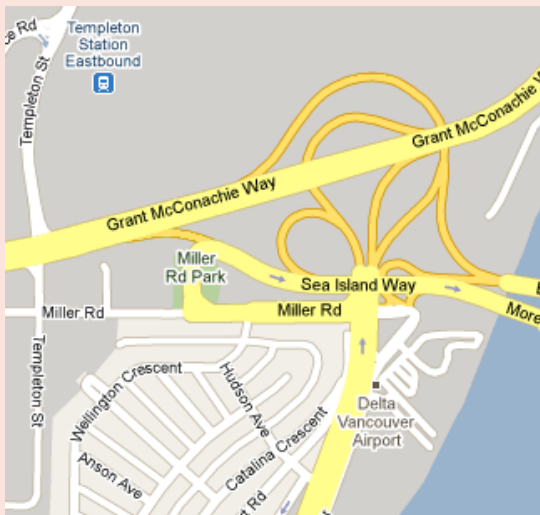


Animation: Can it facilitate?

- 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”)?

10	4	8	5	12	2	6	11	3	9	7	1
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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

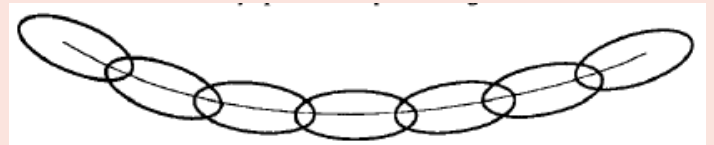
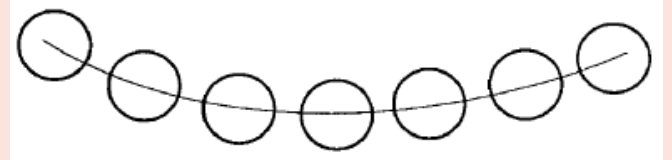
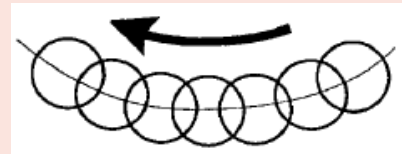
- Time for some fun!
- Framed in terms of character animation, but still applies to visualization
 - We're still telling a story
 - We face the same limitations of audience perception as animators do
- Lists 11 key principles, mention a few here



Principles of Trad. Animation

★ Squash and stretch

- ★ Maintain volume
- ★ Accentuates sense of speed
- ★ Prevents strobing



Principles of Trad. Animation

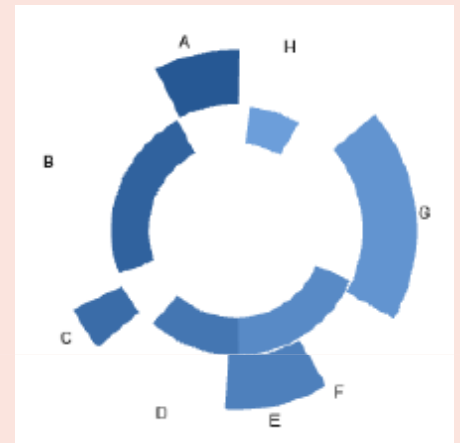
★ Timing

- ★ 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”



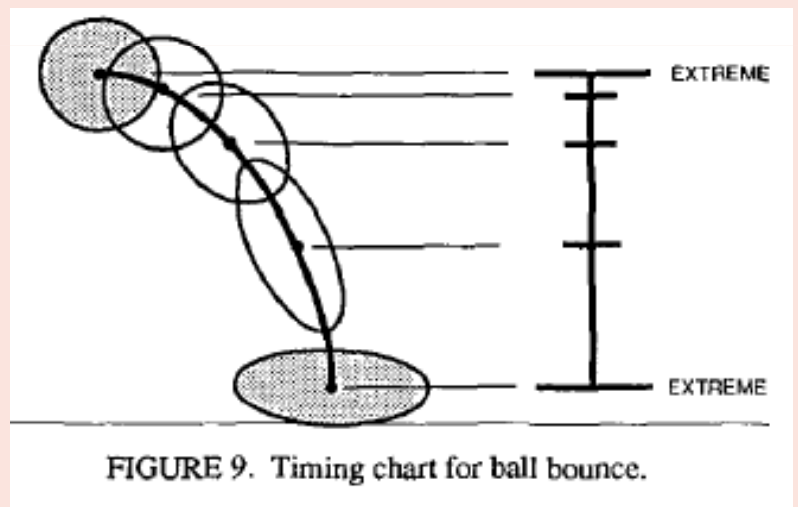


Principles of Trad. Animation

- **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





Principles of Trad. Animation

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

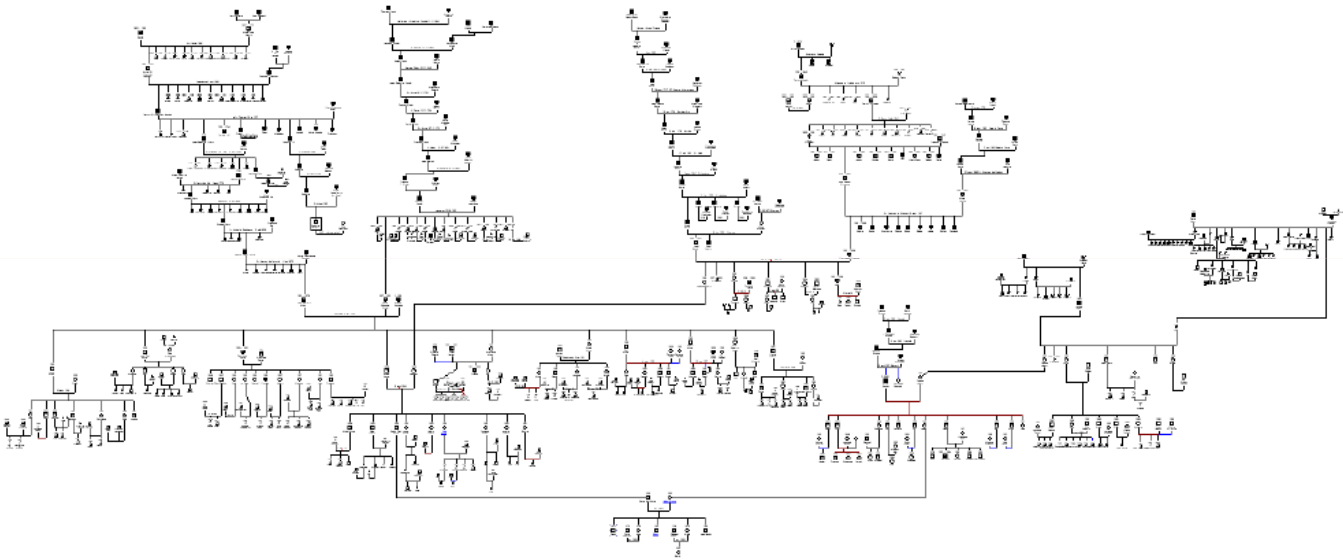


Principles of Trad. Animation

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

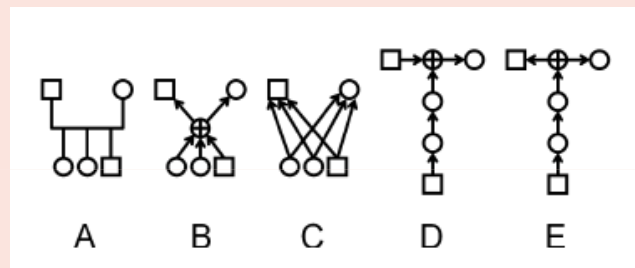


Graph of an actual family, 600+ people over 400+ years

Vis. Of Genealogical Graphs

- Variety of different representations

- E.g. “marriage node”
- Possibly multiple marriages per person





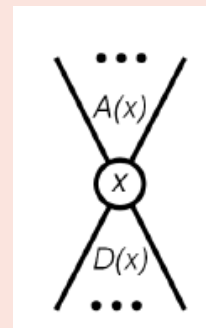
Vis. Of Genealogical Graphs

Problems

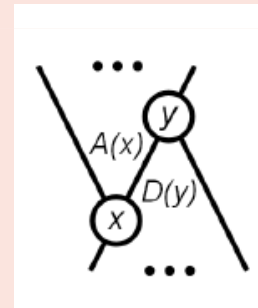
- ★ Long edges (close relatives drawn far away)
- ★ Edge-crossings
- ★ Crowding
- ★ Intermarriage (pedigree collapse)
 - ★ Type 1 (consanguine): spouses are also cousins
 - ★ Type 2 (conjugal): cycle containing another marriage
 - ★ Might not be able to draw generation on one line

Vis. Of Genealogical Graphs

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

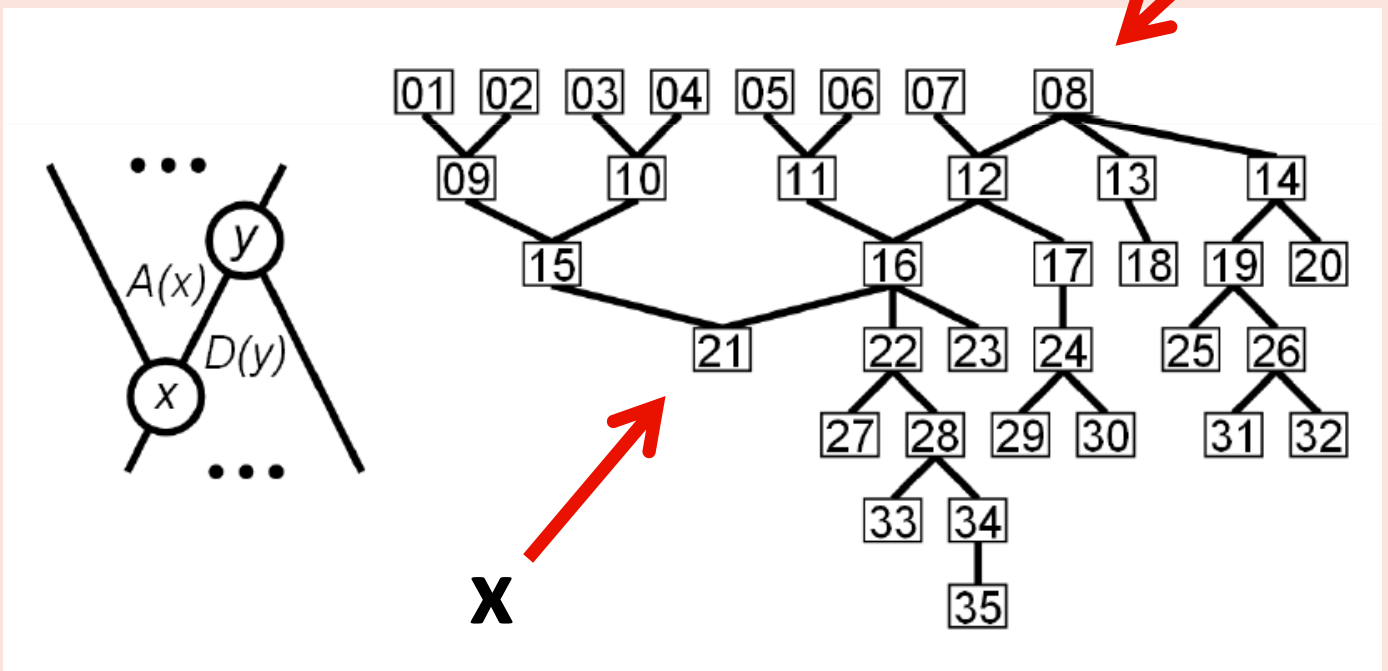


- Dual tree: ancestor tree and descendant tree from different nodes



Vis. Of Genealogical Graphs

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



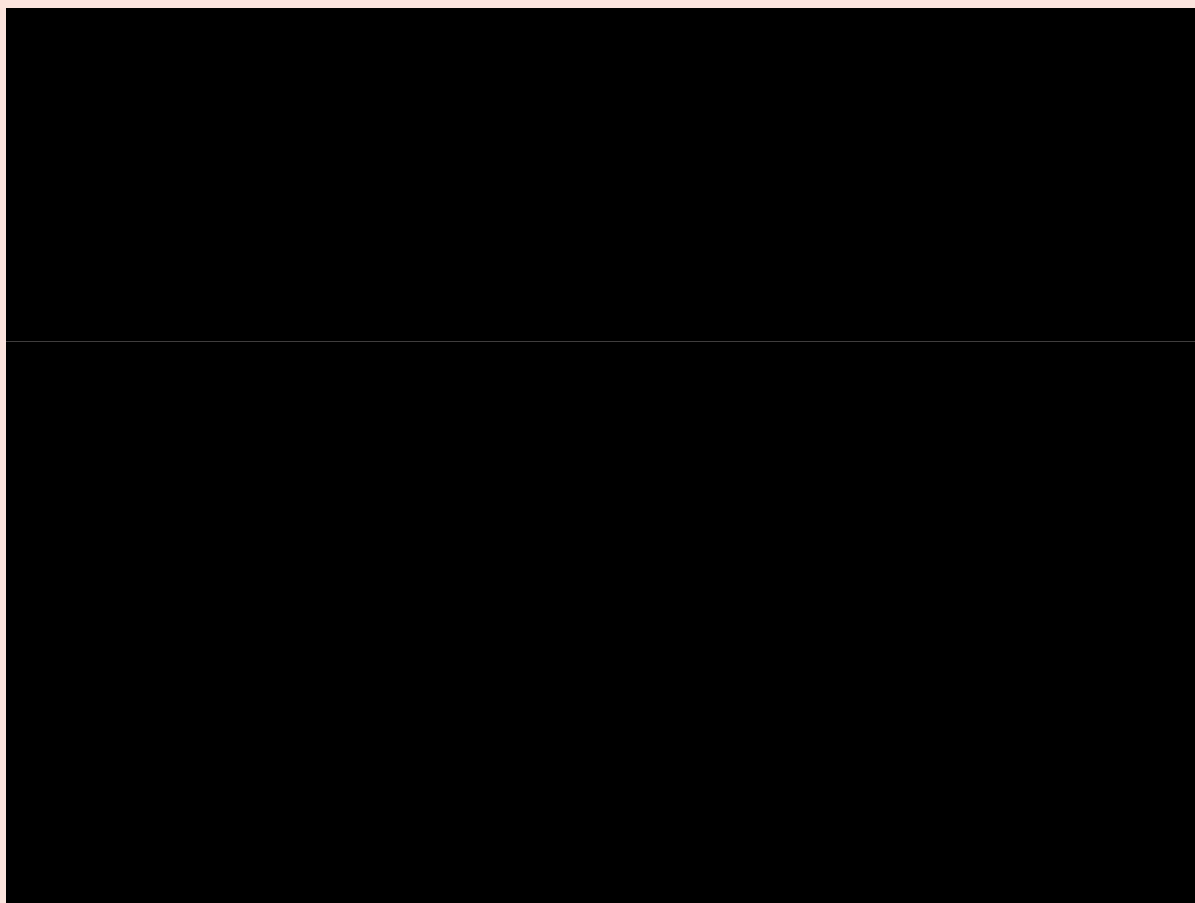


Vis. Of Genealogical Graphs

- ★ 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?