**Theory**

10 min

* Definition  
   creating the illusion of change or movement  
   don’t confuse with interaction (user controlled)
* Uses  
   show dynamic process in real time  
   show variation of a value over time  
   navigate a virtual space  
   draw user’s attention  
   indicate UI activity (folder opening, waiting)
* Reasons to use animation  
   it’s engaging  
   can represent another dimension (time)  
   draws attention powerfully  
   helps user retain context
* Reasons not to use animation  
   it’s cool (tempting)  
   requires replaying for exploration  
   draws attention powerfully (blink)
* Techniques, from cartooning  
   replace sudden transitions with smooth ones  
   fiddle with solidity   
   motion blur  
   dissolves  
   squash and stretch  
   (but don’t distort data)  
   exaggerate change, don’t just mimic reality  
   start early, end late  
   slow in and slow out  
   move along arcs
* Principles from Danyel Fisher  
  change one thing at a time  
   use staging if need to change more at once  
  avoid radical changes  
   don’t animate something that is complete change  
  avoid unnecessary motion  
   excess motion is confusing  
   what is constant shouldn’t move

**Animation Studies**

4 min

* Tversky, Morrison, and Betrancourt, 2002, Animation: Can it Facilitate?  
    
  review of 20+ studies   
  animation vs. sequence of stills  
  most studies reporting diff didn’t compare fairly  
   or differed in procedure  
  when comparison was fair, animation didn’t help or hurt  
  suggested diffs were due to diff in study design
* Griffin et al., 2006, A Comparison of Animated Maps with Static Small-Multiple Maps for Visually Identifying Space-Time Clusters  
  randomly generated clusters moving over time  
  higher %correct for animation  
   but not significant for women alone  
  both men and women were faster w/animation
* Lobben, 2008 Influence of Data Properties on Animated Maps  
  clusters of questions about geographic data  
  learned via static maps or animated maps (timeline, arrows)  
  higher % correct w/animation than static  
  significant diffs in % correct between clusters  
   less in spatial, more in time or attribute properties  
  conclusion: data properties matter in effectiveness
* my conclusion: use sparingly, when it fits the data