News

• Topic choices due tomorrow (Thu) 5pm
• Meet with me before submitting proposal
  – Fully booked tomorrow, fly out Friday, back Mon Oct 31
  – Proposals due 2pm Fri Nov 4

Projects

• Proposal expectations
• Software resources on web
  – And one more time-series data list added

Ware Interaction

• control loops
  – Fitts’ Law
    • time to select depends on distance, target size
  – two-handed interaction
    • coarse vs. fine control: paper vs. pen hold
• learning
  – power law of practice
• vigilance
  – difficult, erodes with fatigue

Ware Interaction 2

• navigation
  – next time
• rapid zooming
  – next time
• distortion
  – next week
• multiple windows, linked highlighting
  – today!
• dynamic queries
  – today!
Ware Thinking with Viz

- problem solving loops
  - external representations
- visual working memory
  - low capacity
  - visual attention
  - gist: 100ms
  - change blindness
  - “world is its own memory”

Memory and Loops

- long term memory
  - chunking
  - memory palaces (method of loci)
- loops
  - problem-solving strategy
  - visual query construction
  - pattern-finding loop
  - eye movement control loop
  - intrasaccadic image-scanning loop

InfoVis Implications

- visual query patterns
- navigation cost
- multiple windows vs. zoom

Cognitive Co-Processor

- animated transitions
  - object constancy
  - fixed frame rate required
- architectural solution
  - split work into small chunks
  - animation vs. idle states
  - governor controls frame rate

- [video: 3D rooms]

SDM

- sophisticated selection, highlighting,
- object manipulation
- [video]

Dynamic Queries: HomeFinder

- filter with immediate visual feedback
- “starfield”: scatterplot
- [video]
DQ 2: FilmFinder

More Linked Views
key infovis interaction principle
so far: Ware, Trellis, cluster calendar, ....
brushing: linked highlighting
Becker and Cleveland, “Brushing Scatterplots”, Technometrics 29, 127-142
new examples:
EDV
Attribute Explorer

Highlighting (Focusing)
Focus user attention on a subset of the data within one graph (from Wills 95)

EDV
Exploratory Data Visualizer

Link different types of graphs: Scatterplots and histograms and bars (from Wills 95)
Baseball data: Scatterplots and histograms and bars (from Wills 95)
- how long in majors
- avg assists vs avg putouts (fielding ability)
- distribution of positions played
- select high salaries
- avg career HRs vs avg career hits (hitting ability)

Linking types of assist behavior to position played (from Wills 95)

Influence/Attribute Explorer
- Visualization for Functional Design, Bob Spense, Lisa Tweedie, Huw Dawkes, Hua Su, InfoVis 95

[video]